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Notified in A.C.Is. for the week ending 3rd January, 1940

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26
G.S. Publications
199



Small Arms Training

Volume I Pamphlet No. 9

MORTAR (3-inch)

1939

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Printed under the Authority of HIS MAJESTY'S STATIONERY OFFICE
by William Clowes & Sons, Ltd., London and Beccles.

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By Command of the Army Council,

I. J. G. P.

THE WAR OFFICE,
3rd January, 1940.

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DISTRIBUTION

This pamphlet is issued on a pool basis. The further distribution within the unit is left to the discretion of the Commanding Officer.

The scale of distribution is as follows :—

Foot Guards and Infantry

Battalions	...	...	...	...	...	70
Motor Battalions	...	...	...	...	...	70
Guards depot	....	...	...	...	...	70
Guards training battalion	...	...	...	...	...	70
Infantry training centre	...	...	...	...	...	70
Officer Cadet Training Unit (Infantry)	...	...	...	...	...	470
Motor depot ...	...	...	...	...	...	70
Motor training centre	....	...	...	...	...	70

DEFINITIONS

Auxiliary aiming mark.—An aiming mark selected by the fire controller for the purpose of giving or maintaining direction for the mortar.

Deflection.—A lateral displacement of the line of fire.

Fire control.—The necessary arrangements and orders for engaging the target.

Fire controller.—The person responsible for giving the orders to the men of a fire unit for the engagement of a target.

Fire direction.—The term applied to instructions given by the commander of more than one fire unit to the fire unit commanders, as to how their fire is to be applied.

Fire for effect.—The term applied to fire used for neutralizing or destroying a target, when ranging has been completed.

Fixed line.—A term denoting that measures have been taken for maintaining elevation and direction in darkness, smoke, etc., so that bombs will fall on a pre-arranged area of ground.

Flanking fire.—Fire applied from a flank across the front of a locality occupied by our own troops or, if they are advancing, at an angle to their advance.

In action.—A mortar is said to be "In action" when it is mounted and laid with men and ammunition present ready to open fire.

Laying.—The process of elevating (or depressing) and traversing a mortar until its axis is made to point in the required direction. On conclusion of this process the mortar is said to be laid.

Line.—The direction in which a mortar is pointed.

Mean point of impact (M.P.I.).—The point round which bombs fired at the same elevation will group themselves.

Observation post.—A post from which a particular area can be kept under observation and from which mortar fire can be controlled and corrected.

Point of origin.—The point from which a smoke screen is generated by successive bursts of smoke bombs.

Position in readiness.—The place at which the mortar and stores are taken off the vehicles and prepared for action.

Ranging.—The process of adjusting the elevation and line by observation of the bombs bursting so that the M.P.I. and the target are brought into coincidence.

Rendezvous.—A pre-arranged place of assembly.

Trajectory.—The curve described by the bomb in its flight.

TRAINING FILMS

Training Film No. B.99 C.73 deals with the 3-inch mortar.

It is in seven parts, each lasting about 10 minutes.

To make the best use of the film, it is recommended that it should be shown to beginners at the following stages in their training:—

Part I.	Introductory.	Before training in the mortar begins.
Part II.	General description and aiming and laying.	Before training in the mortar begins.
Parts III and IV.	Mortar drills.	Before drills are begun, and again when all drill subjects have been taught.
Part V.	Battle procedure—recce. for detachment positions—occupation by day.	Before Lesson 35.
Part VI.	Battle procedure—occupation of defensive position.	Before Lesson 40.
Part VII.	Fire control—methods of obtaining direction.	Before Lesson 45.

WET WEATHER PRECAUTIONS

1. Great care will be taken to ensure that no water is allowed to enter the barrel before or during firing. If it is thought that water has entered the barrel before firing begins, then in war the first bomb will be fired without removing the safety cap on the fuze, in peace the barrel will be dried before firing begins.

2. Mortar numbers will ensure that no water is allowed to reach the holes in the charge container through which the flash passes from primary to secondaries.

GENERAL

SECTION 1.—PUBLICATIONS DEALING WITH THE 3-INCH MORTAR

1. The general principles governing the tactical use of the 3-inch mortar are dealt with in Field Service Regulations, Vol. II, and Infantry Training.

2. The details of the equipment, stores, and ammunition are contained in the Handbook for the M.L. 3-inch Mortar.

3. Details of 3-inch mortar ranges will be given in S.A.T., Vol. II. In the meanwhile they are contained in War Office Letter No. 43/Training/1782 (Q.M.G.7.) dated 4th March, 1936.

4. The Annual Mortar Practice and Safety Precautions are dealt with in S.A.T., Vol. I. Pamphlet 14.

SECTION 2.—CHARACTERISTICS

1.
 - i. The mortar has a very high trajectory. Its elevations are between 45 degrees and 80 degrees.
 - ii. The burst of the H.E. bomb is effective for 100 yards all round from the point of impact.
 - iii. The mortar ranges from 275 yards to 1600 yards.
 - iv. It is extremely flexible and has a traverse of 36 degrees on the traversing gear.
 - v. It is easy to conceal and is capable of being fired behind high cover.
 - vi. It can be fired at night or when blinded by fog or smoke.

- vii. It is capable of sustained fire without excessive overheating.
- viii. The flash is negligible.
- ix. It has a long time of flight—average 20 seconds.
- x. It is seriously affected by damp, and it is therefore essential that both barrel and charges are kept dry.

SECTION 3.—HANDLING

1. The technical handling of the mortar is extremely simple. It is loaded and fired by placing a bomb in the mouth of the barrel and allowing it to slide down to the bottom, where the striker explodes the charge. By observing certain rules of fire control it is a simple matter rapidly to obtain fire effect.

2. The success or failure of its handling, however, will depend almost entirely on the training of the N.C.O. in command of the mortar detachment and individual skill and team work of the members of the detachment.

3. The detachment commander must be full of initiative and have a good eye for country. He should be full of restless curiosity so that he can get his detachment into action to fulfil the role required of it in the shortest possible time. On completion of his task he must regain touch at once with his immediate commander with a view to offering further support.

4. The mortar and its ammunition will normally be carried on a vehicle.

When off the vehicle the mortar requires three men to carry it.

No. 1 carries the base plate and sight—weight 37 lb.

No. 2 carries the barrel and spare parts bag—weight 44 lb.

No. 3 carries the bipod—weight 44½ lb.

These loads are heavy and awkward and can only be man-handled for short distances.

One bomb weighs 10 lb., a maximum load is six bombs.

SECTION 4.—ORGANIZATION

1. The 3-inch mortar platoon consists of headquarters and two or more detachments, each of one mortar. It is commanded by a Warrant Officer, Class III. Each detachment is commanded by a serjeant, with a corporal as second-in-command.

2. The fire unit is the detachment. The detachment will normally be the tactical unit, although, on occasions, the platoon may be employed as one tactical unit.

3. The following is the organization of the platoon :—

Platoon headquarters

Duty	Rank	Vehicles	Arms	Ammunition carried on the man
Pl. Comd. ...	1 W.O. Class III.	1 Motor-cycle.	.38 Pistol.	12 rounds.
Pl. orderly...	1 Pte.	1 Motor-cycle.	.38 Pistol.	12 rounds.
Range-taker ...	1 Pte.	—	Rifle.	50 rounds.

Each detachment

Det. Comd. ...	1 Sjt.	—	Rifle.	50 rounds.
Det. Cpl. ...	1 Cpl.	—	Rifle.	50 rounds.
Det. orderly ...	1 Pte.	1 Bicycle.	Rifle.	50 rounds.
Mortar numbers ...	4 Ptes.	—	Rifles.	50 rounds.
<i>(Attached from No. 6 Platoon.</i>				
Truck driver ...	1 Pte.	15-cwt. Truck.	Rifle.	50 rounds.

Mortar ammunition

Carried on each detachment truck...	...	...	...	H.E.	75
				Smoke	45
<i>Total each detachment...</i>					120

Anti-tank rifle

The platoon has one anti-tank rifle with 200 rounds of .55-inch ammunition. It will be carried on one of the detachment trucks.

SYLLABUS OF TRAINING

SECTION 5.—MORTAR RECRUITS COURSE

1. Syllabus.

<i>Subject</i>	<i>Lesson number</i>
General description ...	1
Ammunition ...	2
Maintenance ...	3
Aiming and laying ...	6 to 10
Signals ...	11 and 12
Elementary mortar drill ...	13 to 26
T.O.E.D.	
Packing the vehicle ...	27
Detachment drill ...	28 to 33
Fire control ...	General lecture
Advanced handling ...	34

2. A suggested sequence of instruction.

Lessons :—1, 13, 14, 15, 6, 7, 8, 9, 16, 17, 18, 11, 19, 20, 21, 22, 10, 12, 23, 24, 25, 26, T.O.E.D. 3, 27, 28, 29, 30, 31, General lecture on fire control, 2, 32, 33, 34.

SECTION 6.—FIRE CONTROLLER'S COURSE (MORTAR TRAINED PERSONNEL)

1. Syllabus.

<i>Subject</i>	<i>Lesson numbers</i>
Testing and adjusting of the sight ...	4 and 5
Battle procedure ...	35 to 43
Fire control ...	44 to 57
Advanced handling ...	34

2. A suggested sequence of instruction.

Lessons :—4, 5, 44, 45, 35, 46, 47, 48, 36, 37, 49, 34, 38, 39, 50, 51, 34, 42, 40, 43, 52, 53, 34, 41, 54, 55, 35, 56, 57, 48, 34.

SECTION 7.—FIRE CONTROLLER'S COURSE (PERSONNEL NOT TRAINED IN THE MORTAR)

- The **Syllabus** should include all lessons in the pamphlet, and T.O.E.D.

A suggested sequence of instruction.

Lessons :—1, 13, 14, 15, 6, 7, 8, 9, 16, 17, 18, 11, 19, 20, 21, 22, 10, 12, 23, 24, 25, 26.

T.O.E.D.

Lessons :—2, 3, 44, 45, 27, 35, 28, 29, 30, 31, 46, 47, 36, 37, 32, 33, 48, 4, 5, 49, 38, 39, 34, 50, 42, 43, 51, 52, 53, 34, 41, 54, 55, 35, 56, 57, 34.

SECTION 8.—SUMMARY OF HOURS

1. Mortar recruit's course.

			<i>$\frac{3}{4}$ hour periods</i>	
<i>Subject</i>			<i>Minimum</i>	<i>Desirable</i>
Elementary drill ...	...	...	20	28
T.O.E.D. ...	...	...	3	3
Aiming and laying ...	...	...	4	7
Detachment drill ...	...	...	12	15
Firing (ranges) ...	...	...	5	10
Advanced handling ...	...	...	7	11
Miscellaneous ...	...	...	7	10
Total periods ...	...	...	58	84

2. Fire controller's course (Mortar trained personnel).

			<i>$\frac{3}{4}$ hour periods</i>	
<i>Subject</i>			<i>Minimum</i>	<i>Desirable</i>
Testing and adjusting the sight ...	...	...	2	4
Battle procedure ...	...	...	12	22
Fire control ...	...	...	20	32
Advanced handling ...	...	...	4	8
Total periods ...	...	...	38	66

3. Fire controller's course (personnel not trained in the mortar).

			<i>$\frac{3}{4}$ hour periods</i>	
<i>Subject</i>			<i>Minimum</i>	<i>Desirable</i>
Elementary drill ...	...	...	15	20
T.O.E.D. ...	...	...	2	2
Aiming and laying ...	...	...	4	6
Detachment drill ...	...	...	8	12
Testing and adjusting the sight ...	...	...	2	4
Battle procedure ...	...	...	12	22
Fire control ...	...	...	20	32
Advanced handling ...	...	...	4	8
Miscellaneous ...	...	...	5	8
Total periods ...	...	...	72	114

MECHANICAL SUBJECTS

SECTION 9.—GENERAL DESCRIPTION

(See Plates I, II, and III)

LESSON I.—GENERAL DESCRIPTION

Instructor's notes

Stores :—

Mortar complete, carrying harness, and two bomb carriers.

In order to arouse the interest of the squad from the beginning, each man will be given an opportunity of handling the various parts of the mortar, and of assembling and dismounting it during this lesson. The squad should not be expected to learn by heart the names of all the parts at this stage, but should be reminded of the names as they arise in subsequent lessons.

1. Show to the squad the base-plate, barrel and bipod.

Explain :—

- i. That the breech end of the barrel fits into the base plate which takes the shock of firing.
- ii. That the bipod is designed to form a firing support for the barrel.

2. Assemble the mortar.

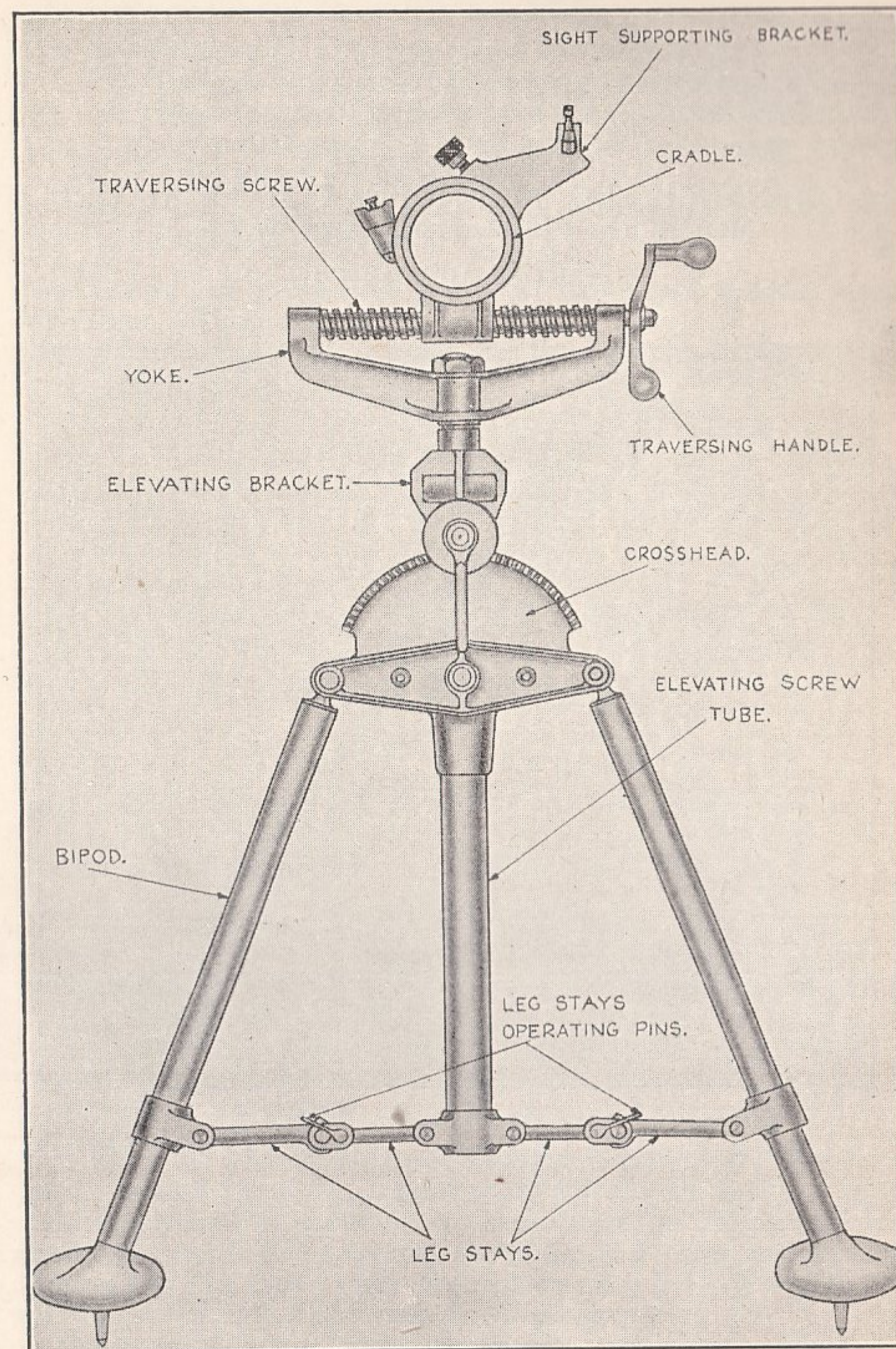
Explain :—

- i. The elevating gear, and show how the mortar is elevated and depressed by means of the operating handle.
- ii. The traversing gear, and show how a limited amount of traverse is obtained without moving the legs of the bipod.

3. Lock the sight on to the bracket.

Explain :—

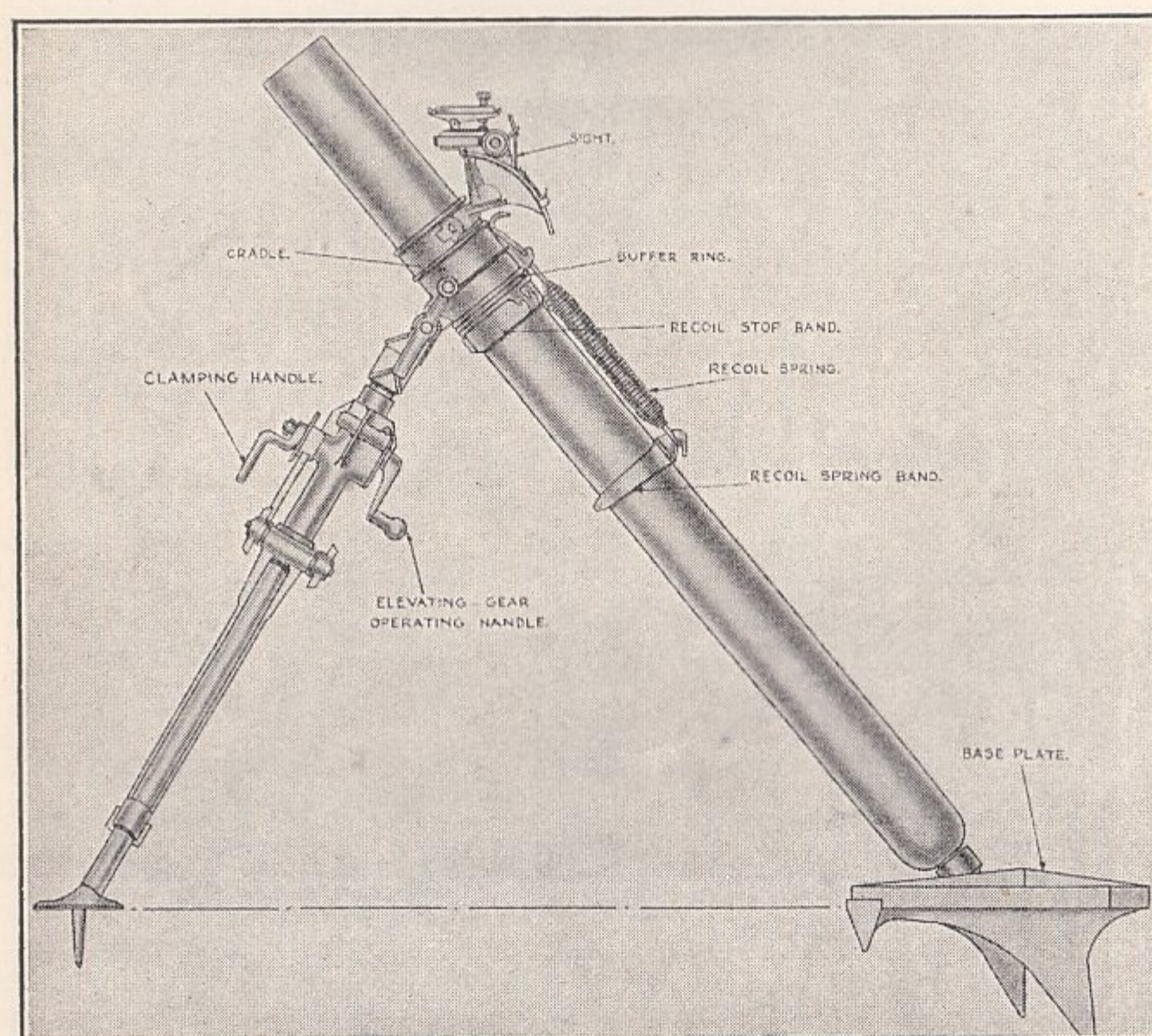
- i. That the sight is provided for laying the mortar by indirect means.
- ii. That it provides an all-round field of view for laying for line.
- iii. That, by means of the range scale and the longitudinal bubble, the mortar is laid at the required quadrant elevation.



[To face page 6

ORDNANCE, M.L. 3-IN. MORTAR, MARK II, ON
MOUNTING, 3-IN. MORTAR, MARK I

(General Arrangement)



[To face page 7

4. Point out the cross-levelling gear.

Explain :—

- i. That the sight must be kept in the vertical plane.
- ii. That the cross-level bubble is provided to compensate for difference in level of the bipod legs and/or the effect of the traverse.
- iii. That when the cross-level bubble is central, the sight is vertical.

5. Name the remaining principal parts and explain their functions. These are :—

- i. Leg stays and locking pins.
- ii. Clamping handle.
- iii. Cradle.
- iv. Clinometer plane.
- v. Buffer ring.
- vi. Recoil stop band.
- vii. Recoil spring.
- viii. Recoil spring band.
- ix. Breech piece.
- x. Striker stud.

6. Explain the use of the carrying harness.

SECTION 10.—AMMUNITION

LESSON 2.—AMMUNITION

Instructor's notes

Stores :—

- One dummy bomb (H.E.).
- One dummy bomb (Smoke).
- One dummy primary cartridge.
- Six dummy secondary cartridges.
- One drill bomb carrier.

1. Service ammunition.—There are two types of service ammunition, the H.E. bomb and the smoke bomb. Both range in the same manner, are streamlined in shape, and are threaded at the head to receive the fuze, and at the base to receive the tail unit. Into the tail unit are fitted the primary and augmenting (or secondary) cartridges.

The bombs are carried in expendable carriers each containing three bombs, and a tinned-plate cup and waterproof cover are fitted over the tail unit to ensure that the cartridges are protected from damp.

2. Practice ammunition.—There are three types :—

- i. Powder filled bomb, similar to H.E. bombs but with a greatly reduced explosive content.
They are cheaper to produce than H.E., and require a smaller danger area.
- ii. Sand-filled bombs. These are issued together with a supply of primary cartridges so that the drill of firing may be practised in any convenient open space. The bombs are fired without secondary cartridges, and have a maximum range of about 200 yards. They may be recovered and used again.
- iii. Drill bombs.

3. Markings.

- i. *The H.E. bomb.*—Immediately below the fuze, there is a red ring which denotes that the bomb is filled, and below the red ring there is a green band.
- ii. *The H.E. bomb carrier* has a yellow band painted round the middle.
- iii. *The smoke bomb.*—Immediately below the fuze is a red ring, and the whole of the remainder of the head of the bomb is painted green.
- iv. *The smoke bomb carrier* has a green band painted round the middle.
- v. *The powder-filled bomb.*—The head of the bomb is painted black, denoting a practice bomb. Immediately below the fuze is a red ring, and below that a yellow band.
- vi. *The powder-filled bomb carrier* has a black band painted round the middle.
- vii. *The sand-filled bomb.*—No fuze. Painted black all over. The words "Weighted" and "Sand" are stamped on it.
- viii. *The drill bomb.*—Painted black all over. The word "Drill" is stamped on the body of the bomb.

4. The charges.

- i. Show how the primary cartridge is fitted into the cartridge container, and how the secondary cartridges are held between the vanes of the tail unit. Show that the secondary cartridges are easily detachable in order to allow of the mortar being fired with Charge I. (3 secondary cartridges.)
- ii. Explain how the flash passes from the primary to the secondary cartridges.

5. The fuze.

- i. Explain the function of the safety cap.
- ii. Explain that, on impact with a hard substance, it is the action of the fuze which detonates the bomb.

SECTION 11.—MAINTENANCE

LESSON 3.—MAINTENANCE

Instructor's notes

Stores :—

Mortar complete. Cleaning rod. Brass scrubber.

1. **The Barrel.**—The barrel must be kept clean and free from rust, and the bore slightly oiled. After continuous firing, when opportunity permits, the breech-piece with striker should be removed and the bore should be thoroughly washed out with fresh hot water and allowed to drain. It should then be dried out and, when cool, oiled by means of a cloth tied over the cleaning rod. The breech-piece with striker stud should be cleaned and oiled. In re-assembling, the copper washer must be in position and the breech-piece tightly screwed home.

The clinometer plane must not be cleaned with abrasive material such as emery cloth, scratch card or bath brick. Any rust on the plane will be loosened by a coat of paraffin and then rubbed off with cotton waste. Care must be taken to prevent the plane being damaged or burred and, if it is unlikely that the mortar will be used for some considerable time, it should be coated with mineral jelly.

2. **The Mounting.**—The mounting must be kept clean and all working parts such as the elevating, traversing and cross-levelling gears well lubricated. The recess in the base plate, which receives the rear end of the breech-piece, must be kept free from earth. Locking bolts must be examined to ensure that they have not worked loose and that the locking pins are functioning correctly.

3. **The Sight.**—The sight must be handled with great care and all parts kept clean; the working parts must be lubricated with clean oil.

In order to keep the sight and clinometer in perfect condition, they will be kept in their respective cases when not in use.

4. Points before, during and after firing.

i. Before firing :—

- (a) Ensure that the barrel is absolutely dry and free from oil.
- (b) See that the striker stud is screwed tightly home.
- (c) See that the copper washer is on the breech-piece.
- (d) See that the breech-piece is screwed tightly home.
- (e) Ensure that the flats on the breech-piece are so positioned that it will lock into the base plate.

ii. During firing :—

- (a) Watch the breech-piece to see that it is not coming unscrewed.
- (b) When opportunity permits, unscrew the breech-piece and remove fouling on the striker stud, clean the barrel with dry rag over the cleaning rod, and screw the breech-piece tightly home.

iii. After firing :—

- (a) Remove the breech-piece with striker stud.
- (b) Wash out the bore with fresh hot water and allow it to drain.
- (c) Dry out the bore and, when cool, oil it by means of a cloth tied over the cleaning rod.
- (d) Clean and oil the breech-piece and striker stud.
- (e) Re-assemble ensuring that the copper washer is in position and that the breech-piece is tightly screwed home.
- (f) In cases of bad fouling, the bore may be cleaned with a brass scrubber after permission has been obtained from a warrant officer.

SECTION 12.—THE TESTING AND ADJUSTMENT OF THE SIGHT

(See Plate III)

The sight should be frequently tested to prove that it is in adjustment both for direction and elevation. Errors in direction may be due to the displacement of the worm wheel bracket, while errors in elevation may be due to the range scale bracket or the range scale slider being bent or damaged.

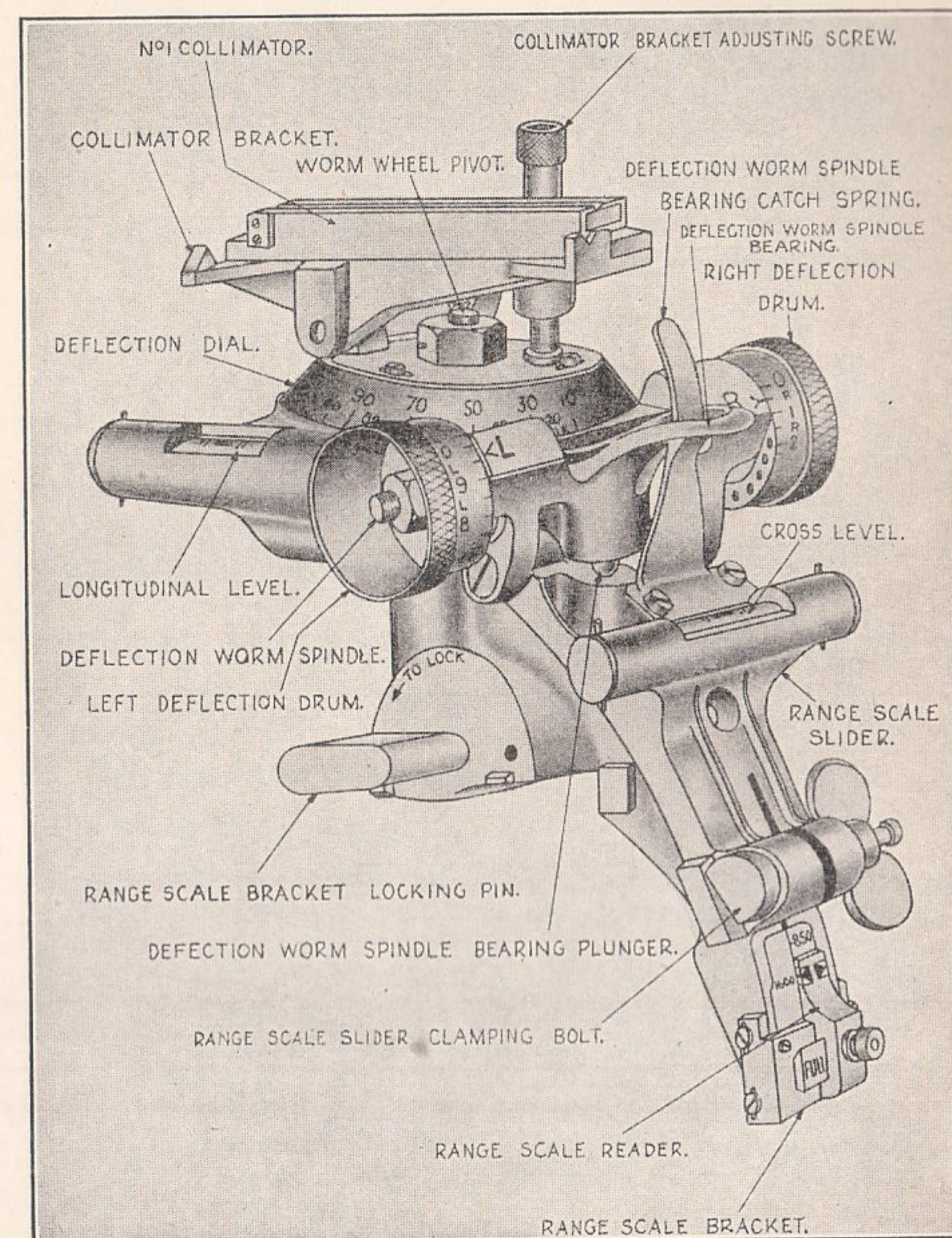
LESSON 4.—TO TEST AND ADJUST FOR DIRECTION

Instructor's notes

Stores :—

4 posts from which to suspend two plumb lines. 2 plumb lines. Mortar complete.

SIGHT, 3-IN. MORTAR, MARK I
(Arrangement)



[To face page 10]

1. To test for direction :—

- i. Choose a distant aiming point on which the mortar can later be laid. Suspend two plumb lines about 5 yards apart and align them accurately on to the selected aiming point.
- ii. Mount the mortar about 10 yards in front of the plumb lines. The base plate must be moved and the barrel traversed until the plumb lines accurately bisect the barrel throughout its length. The barrel is now laid on the same point as the plumb lines.

Now bring the cross-level bubble central and check the aim with the sight, which should be on the selected aiming point. If it is not, the sight requires adjustment for direction.

2. To adjust for direction :—

Loosen the three screws in the elongated slots in the worm wheel bracket and move the collimator bracket in the required direction until the sight is laid on the aiming point. Having made the adjustment tighten the screws and re-check the aim.

NOTE.—The three screws referred to are those of which the heads project above the worm wheel bracket.

LESSON 5.—TO TEST AND ADJUST FOR RANGE

Instructor's notes

Stores :—

Field clinometer and mortar complete.

1. To test for range :—

- i. Lay the mortar for elevation at an angle of 69 degrees, 47 minutes, which is the elevation corresponding to 1000 yards range with charge 2. To do this set the field clinometer plane on the barrel. Position the barrel by means of the operating handle until the clinometer bubble becomes central.
- ii. Bring the longitudinal bubble of the sight central by operating the wing nut and the range scale slider. The sight should now read 1000 yards on the charge 2 scale. If it does not give this reading adjustment is necessary.

2. To adjust for range :—

Position the range scale reader for full charge. Slacken the wing nut of the range scale slider and bring the longitudinal bubble central. Tighten the wing nut.

Slacken the four screws adjusting the range scale reader and position the reader to read 1000 yards on the charge 2 scale. Tighten up the adjusting screws and check that bubble is still central.

NOTE.—The screws adjusting the range scale reader are positioned two on each side of the range scale slider and pass through the elongated slots in the range scale reader.

ELEMENTARY TRAINING

SECTION 13.—AIMING AND LAYING

LESSON 6.—AIMING

Instructor's notes

Stores :—

Mortar complete.

Blackboard or diagrams.

1. Aiming with the mortar sight.

Explain :—

- i. The rules of aiming, using a blackboard or diagrams ; that the eye should be about three inches from the sight and that either eye may be used, but preferably the right.
- ii. That the tip of the arrow must be laid on the lowest central part of the aiming mark.
- iii. That with the open sight the aim will be taken as for the rifle.

2. The squad will view an aim laid by the instructor and will practise.

3. Aiming for direction.

Explain :—

How to aim, using the traversing handle and the sight adjusting screw.

4. The squad will view an aim laid by the instructor and will practise.

LESSON 7.—LAYING FOR DIRECTION

Instructor's notes

Stores :—

Mortar complete.

1. Explain how to lay for direction introducing the use of the cross-level bubble.

The instructor will act as No. 2 and will detail one of the squad to act as No. 1.

2. While No. 1 is obtaining direction as in Lesson 6 demonstrate and explain that the No. 2 must keep the cross-level bubble in the centre of its run.

3. Practise squad in the duties of No. 2.

NOTE.—Before starting each lay, the cross-level bubble will be central, but the mortar will not be laid on the aiming mark.

LESSON 8.—LAYING FOR ELEVATION

Instructor's notes

Stores :—

Mortar complete.

1. Explain the graduations on the range scale, and how to set the slider and charge indicator.

2. Explain that the limits of range when using charge I are from 275 to 850 yards, and when using charge II from 525 to 1600 yards.

3. Demonstrate how to bring the bubble central in the longitudinal level by the use of the operating handle.

4. Practise squad in :—

- i. Setting the slider and charge indicator.
- ii. Levelling the bubble combined with (i) above.

LESSON 9.—LAYING FOR ELEVATION AND DIRECTION

Instructor's notes

Stores :—

Mortar complete.

1. Explain that this lesson is a combination of Lessons 7 and 8 and that, in order to reduce the time taken to lay the mortar, the following is the correct procedure :—

- i. No. 1 will set the range scale slider and, by looking through the sight, he will note the approximate distance in degrees between the present aim and the aiming mark ordered. He will rapidly turn the traversing handle in order to obtain approximate direction. He will then lay the mortar for elevation.

NOTE.—One half turn of the traversing handle deflects the mortar approximately one degree.

- ii. No. 2, while No. 1 is laying for elevation, will bring the cross-level central.

iii. Nos. 1 and 2 will lay accurately for elevation and direction.

3. Practise squad in the duties of Nos. 1 and 2.

4. Explain the use and setting of the deflection dial and drum.

5. Practise squad.

SECTION 14.—NIGHT AIMING

LESSON 10.—AIMING AND LAYING BY NIGHT

Instructor's notes

Stores :—

Mortar complete, night aiming box, aiming post and torches.

No value will be obtained from this lesson unless it is conducted in a dark room or out of doors under cover of darkness.

The instructor must assist the layers by the use of his torch.

On completion of each lay, the instructor must check both the sight bubbles and the aim.

1. Explain the working of the night aiming box and how the lamp fits on to the aiming post.

2. Demonstrate how to obtain approximate direction by aligning the luminous strip of the barrel on the lamp.

3. Demonstrate how to lay the mortar on the lamp.

4. Practise squad in Lesson 9 under conditions of darkness.

SECTION 15.—SIGNALS

NOTE.—These signals are required for use in the mortar platoon in addition to the field signals given in Infantry Training.

LESSON 11.—FIELD SIGNALS

Instructor's notes

Stores :—Nil.

1. Demonstrate and explain the following signals :—

- i. “**Action.**”—Both arms fully extended, raised from the sides to a position level with the shoulders and lowered again. The motion to be repeated quickly several times.
- ii. “**Cease firing.**”—The arm swung in a circular motion in front of the body.

2. Practise squad.
3. Demonstrate and explain the following semaphore signals :—

Code letter A.—Detachment commanders or	} To join immediate Superior.
detachment corporals.	
AA.—All N.C.Os.	
B.—More ammunition required.	
H.—Vehicles to come up.	

4. Practise squad.

LESSON 12.—FIRE CONTROL SIGNALS

Stores :—Nil.

1. Demonstrate and explain the following signals :—
 - i. **“Acknowledged.”**—Used to acknowledge a verbal order which has been received and understood.—The left arm extended above the head and immediately lowered.
 - ii. **“Repeat.”**—The left arm remaining extended above the head and “repeat” called for.
 - iii. **“Prepare to fire.”**—The fire controller’s arm raised above his head.
 - iv. **“Fire.”**—The fire controller’s arm cut away to the side.
 - v. **“Stop.”**—The arm waved horizontally to and fro across the body.
2. Practise squad.
3. Demonstrate and explain the following signals for use in long control :—
 - i. A shot, or the M.P.I. of a group of shots, observed beyond or plus of the target.—The arm extended from the shoulder pointing in the direction of the target.
 - ii. A shot, or the M.P.I. of a group of shots, observed short or minus of the target.—The arm extended from the shoulder pointing away from the target.
 - iii. A shot, or the M.P.I. of a group of shots, observed incorrect for line by 30 minutes.—One hand above the head, the other pointing horizontally to the side of the target on which the bomb or bombs fell.
Repeat the signal for every 30 minutes which the shot is away from the correct line.
4. Practise squad.

SECTION 16.—ELEMENTARY MORTAR DRILL

Instructor’s notes

1. *Object*—To teach the soldier to handle the mortar and ammunition so that in war correct action will be instinctive.

2. *Stores required for all lessons in this section.*—Base-plate, barrel, bipod, sight and case, two bomb carriers with dummy bombs, spare parts bag and two aiming posts.

3. *Safety precautions.*—At the beginning of each lesson, when dummy bombs are used, the instructor will inspect them to ensure that the primary and secondary cartridges, fuzes and bombs are dummy.

NOTE.—All executive words of command are in inverted commas.

LESSON 13.—FALL IN AND TAKE POST

Instructor’s notes

The lying position will always be adopted where possible and ground sheets should be used when necessary. When in the lying position, the position of attention will be arms folded, heels together. The orders “Rest” and “Position” will be given when necessary.

In taking post, the following positions are the most suitable :—

- No. 1 in rear of the base-plate.*
- No. 2 on the right of the barrel.*
- No. 3 on the left of the bipod.*

1. **Lay out of stores.**—Base-plate on the ground facing the front, with it the sight and case. Barrel a short distance to the right of the base-plate, muzzle to the front, with it the spare parts bag. Bipod a short distance in rear of the base plate and barrel, legs to the rear, sight pillar and operating handle on top. Bomb carriers a short distance apart and in rear of the bipod.

2. **“Fall in”.**

The instructor details any four men, who will be called a detachment; he falls them in a short distance in rear of the stores facing the front, and numbers them off. The remainder of the squad will be so placed that they can see and hear what takes place.

If at any time the instructor should order **“Fall out 1”**, 1 becomes 4, 2 becomes 1 and so on, and they re-number at once.

3. "Take Post".

No. 1 doubles to the base-plate. He will see that it is not damaged, that the socket is free from dirt and grit, that the sight is correct and the range indicator towards the bottom of the scale. He will put the sight case over his shoulder. When all numbers have reported to him, he will report "**All correct**" (or otherwise) to the instructor.

No. 2 doubles to the barrel. He will see that the breech-piece is screwed home, that the striker is correct, that the recoil spring and buffer ring are attached and that the muzzle cover is on. He will inspect the contents of the spare parts bag and place the strap over his shoulder. When ready, he will report "**Barrel correct**" (or otherwise) to No. 1.

No. 3 doubles to the bipod. He will see that the cradle is central, that the cross-level screw moves easily and is set over the hooks of the cradle, that the sight bracket and pillar are undamaged and free from dirt, that the clamping plate is central and the handle is tight, that the traversing and elevating screws work easily and that the legs move freely. When ready, he reports "**Bipod correct**" or otherwise to No. 1.

No. 4 doubles to the bomb carriers. He will inspect the bombs, see that they are fused and that the safety caps are tight but not stuck. He will see that the waterproof covers are over the tail units. When ready, he reports "**Ammunition correct**" or otherwise to No. 1.

LESSON 14.—MOUNT MORTAR (FLAT GROUND)

Instructor's notes

1. "*Mount mortar*" should be taught in the following phases :—

1st Phase.—The action of No. 1 until he is behind the base-plate with the sight adjusted to charge 2—800 yards.

2nd Phase.—The action of No. 2 until he has unhooked the recoil spring.

3rd Phase.—The complete action of No. 3 combined with the further actions of Nos. 1 and 2.

4th Phase.—The complete action of No 4.

2. The most convenient way for Nos. 2 and 3 to bring their loads into action is as follows :—

No. 2 with the breech-piece loading.

No. 3 with his left hand under the hooks of the cradle and his right hand at the elevation tube, one leg of the bipod under his right arm and the spikes pointing in towards him.

3. The normal position for the gun numbers when the mortar has been mounted will be the kneeling position.

"Mount mortar".

No. 1 doubles forward with the base-plate and places it on the spot indicated, aligning it on the aiming mark by means of the centre rib. He then moves in rear of the base-plate, removes the sight from its case and sets it at Charge 2—800 yards. When the bipod has been attached, he aligns the barrel approximately on to the aiming mark by directing No. 3 to move the bipod in the required direction. When satisfied, he orders "**Stamp in**". He then moves forward, locks the sight in position and takes up his position on the left of the mortar.

No. 2 doubles forward with the barrel and inserts the breech-piece into the socket with the clinometer plane towards him. He then turns the barrel until the clinometer plane is uppermost and unhooks the recoil spring from the stop band. On the arrival of the bipod he removes the muzzle cover, guides the barrel into the cradle, attaches the recoil spring to the hooks of the cradle and replaces the muzzle cover. He then elevates the mortar until about six inches of the elevating screw are showing, centralizes the cross-level bubble and takes up his position on the right of the mortar.

No. 3 opens the legs of the bipod and locks the leg stays. He then doubles forward with the bipod and places it, with the spikes on the ground, about one pace in front of the base-plate with the sight pillar and traversing handle to his right. Assisted by No. 2 he then guides the cradle over the barrel and, when the recoil spring has been attached, he moves the bipod as directed by No. 1. He stamps in the shoes of the bipod when ordered and takes up his position in rear and slightly to the right of No. 2.

No. 4 doubles forward with two bomb carriers and places himself in rear of No. 3, putting the bomb carriers on the ground in a convenient place from which to handle ammunition.

LESSON 15.—DISMOUNT MORTAR (FLAT GROUND)

"Dismount mortar".

No. 1 centralizes the cradle and removes the sight, adjusting it to the bottom of the slider and returning it to its case. He then lies down in rear of the base-plate.

No. 2 removes the muzzle cover, and releases the recoil spring and, when the cradle has been removed, attaches it to the recoil stop band. He supports the barrel while the cradle is being removed and then replaces the muzzle cover. He unlocks and

removes the barrel from the base-plate and lies down with the barrel beside him a short distance to the right of the base-plate.

No. 3 winds in the elevating screw, slides the cradle off the barrel and doubles round to the right with the bipod to a position a short distance in rear of the base-plate. He closes the legs of the bipod and lies down beside it.

No. 4 tightens up the safety caps on the bombs and fastens the waterproof covers over the tail pieces. He replaces the bombs in the carriers, secures the lids and doubles with them to a position a short distance in rear of No. 3 where he lies down.

LESSON 16.—MOUNT MORTAR (ROUGH GROUND)

"Mount mortar".

Nos. 1, 2 and 3 act as taught in Lesson 14, up to the alignment of the barrel. When aligning the barrel on the aiming mark No. 3 keeps the shoes off the ground and, when ordered to "Stamp in" acts as already taught.

When the shoes have been stamped in, No. 1 orders "Un-clamp" on which order No. 3 loosens the clamping handle. No. 1 then orders No. 2 to move the barrel until it is aligned on the aiming mark and, when satisfied, he orders "Clamp up." No. 3 tightens the clamp and takes up his position.

LESSON 17.—DISMOUNT MORTAR (ROUGH GROUND)

"Dismount mortar".

The numbers act as taught in Lesson 15 with the following additions:—

No. 3 on reaching his position in rear of the base plate, centralizes the clamp in addition to his other duties.

LESSON 18.—PROCEDURE ON THE CHARGE BEING ORDERED

1. "Charge . . .".

No. 4 commences to prepare bombs by removing them from the carrier, untying the tail unit covers, removing three secondaries in the case of Charge 1, or seeing that all six are intact in the case of Charge 2, and replacing the bombs in the carriers with the tail units on but still untied.

For drill purposes, three dummy bombs will be prepared. When firing is being carried out, No. 4 who may require the assistance of No. 3 will commence to prepare all the bombs that have been brought to the mortar position, unless he receives orders to the contrary.

LESSON 19.—TO LAY THE MORTAR

(See Plate IV)

1. "No. . . . Detachment, charge . . . , . . . Hundred.

No. 1 acknowledges the order and, assisted by No. 2, lays the mortar as taught in Lesson 9; when laid he raises his left arm and reports "On".

2. Procedure when the mortar cannot be laid for elevation without moving the bipod.

No. 1 exposes the elevating screw about six inches and orders "Bipod." Nos. 1 and 2 grasp the barrel with one hand and the legs of the bipod with the other. Under the direction of No. 1 they move the bipod nearer to or further from the base plate, and, when No. 1 is satisfied, he orders "Stamp in." Nos. 1 and 2 stamp in the shoes and complete the laying.

3. Procedure when the mortar cannot be laid for direction without moving the bipod.

No. 1 centralizes the cradle and orders "Bipod." Nos. 1 and 2 move the bipod under the direction of No. 1 who, when satisfied, orders "Stamp in." Nos. 1 and 2 stamp in the shoes and complete the laying.

NOTES:—

1. When moving the bipod for elevation or direction it may sometimes be necessary both to centralize the cradle and expose the elevating gear six inches.

2. Having moved the bipod for direction, the mortar when laid should be within four degrees of the centre of the traverse.

LESSON 20.—TO LAY ON POSTS

Instructor's notes

1. The farther post must be planted first and aligned on the target, then coming back towards the base plate position, plant the nearer post aligning it on the first post and the target.

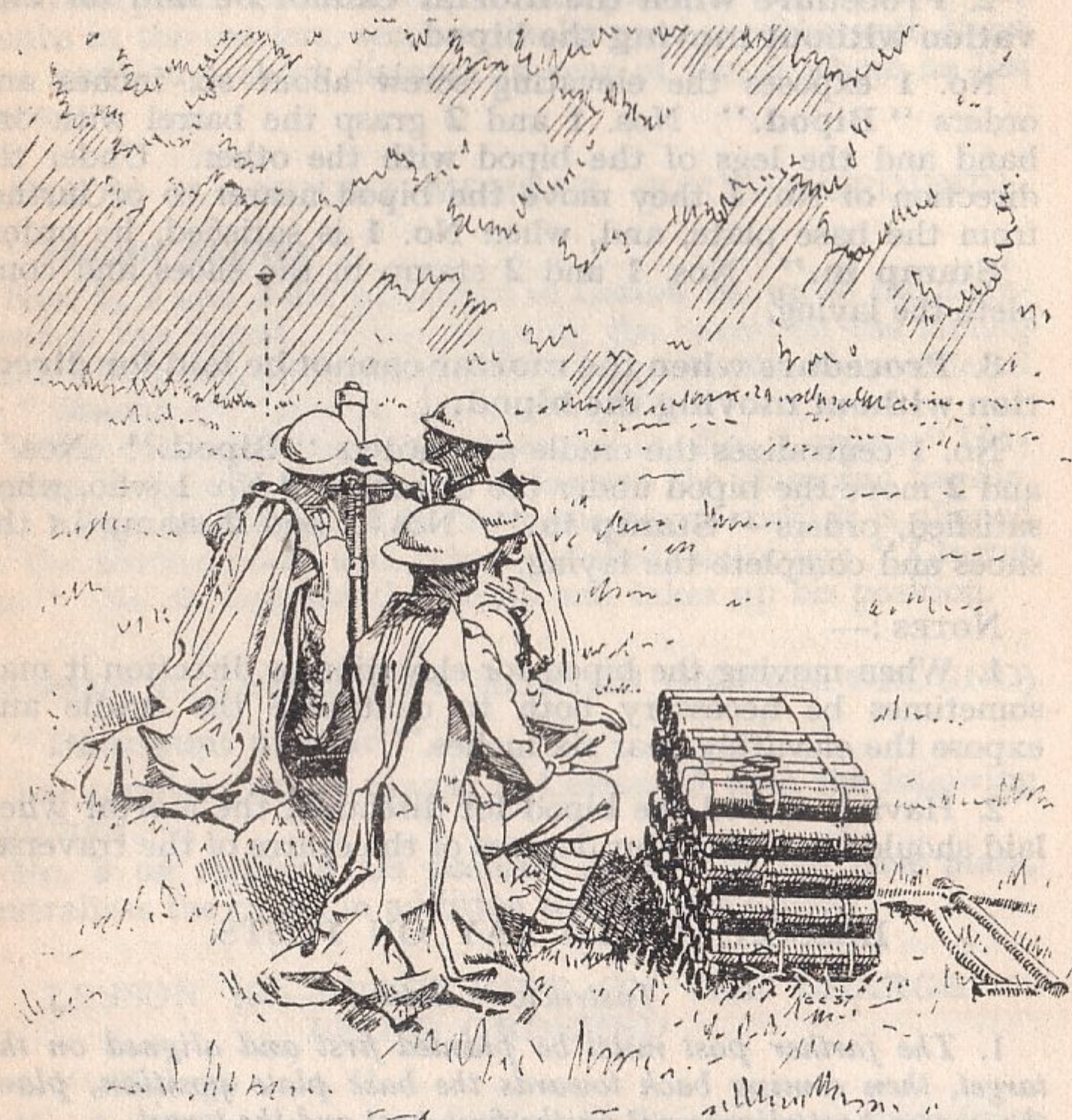
2. When the lay is completed, the cradle should be within four degrees of the centre of the traverse.

3. The instructor will plant two aiming posts and indicate the base plate position.

1. "Mount mortar".

No. 1 obtains direction for the base-plate by aligning the two left lifting loops on to the aiming posts. The mounting

RANGE AND CHARGE ORDERED; LAY NOT COMPLETED



NOTES.—1. Nos. 1 and 2 laying mortar.
2. No. 4 has prepared three bombs and returned them to the carrier, until No. 1 reports "On".

is then completed as in Lesson 14 with the exception that No. 1 when obtaining approximate direction aligns the sight pillar and not the barrel on to the aiming posts.

2. When ordered to do so Nos. 1 and 2 lay the mortar as taught in Lesson 9. If No. 1 finds that the line of sight does not pass through the two aiming posts, he moves the base-plate until the aim is correct ordering No. 2 to assist him if necessary.

LESSON 21.—TO LAY ON AN AUXILIARY AIMING MARK

1. "Mount mortar".

The mortar is mounted with reference to the target, and the auxiliary aiming mark is then indicated to No. 1.

While No. 1 is setting the range scale slider, the angle of deflection between the auxiliary aiming mark and the target is ordered.

E.g. "Right two owe degrees".

No. 1 acknowledges and sets the deflection dial and/or drums accordingly.

Nos. 1 and 2 lay on the auxiliary aiming mark.

No. 1 zeros the dial and, by means of the collimator adjusting screw only, aims at a convenient aiming mark and reports "On". If no convenient aiming mark is available, No. 2 will plant an aiming post.

NOTES:—

1. Auxiliary aiming marks to the left of the target should be chosen whenever possible since the barrel obstructs the line of sight to the right.

2. The angle between the auxiliary aiming mark and the target must be measured by hand or by gratitudes from a point close to the mortar position.

LESSON 22.—TO FIRE

(See Plates V and VI)

1. "On".

When No. 1 reports "On", No. 4 removes a bomb from the carrier, loosens the safety cap, and passes the bomb to No. 3. No. 3 removes the safety cap and passes the bomb, vanes foremost, to No. 2.

No. 2 takes the bomb with his left hand on the top near the vanes, and with his right hand underneath near the fuze.

LAY COMPLETED, NO. 1 HAS REPORTED
"ON"



NOTES.—1. Position of No. 1's hand.

2. No. 2 has a bomb with the safety cap removed but the tail unit cover still in position.

3. The muzzle cover is still on.

4. Nos. 3 and 4 are not passing up any more bombs because only one round has been ordered.

NO. 1 HAS ORDERED "FIRE"



NOTES.—1. No. 1 has removed the muzzle cover.

2. No. 2 is removing the tail unit cover.

3. Only one bomb has been taken from the carrier.

2. "Fire".

No. 1 lowers his left arm, removes the muzzle cover, and orders "Fire".

No. 2 removes the tail-unit cover, places the bomb into the barrel vanes foremost and, when the lower guide band is below the muzzle, releases the bomb. He then draws his hands clear of the barrel.

As soon as the mortar has fired, No. 1 replaces the muzzle cover and relays at once, assisted by No. 2.

3. "... rounds".

When more than one round is ordered, No. 1 acknowledges the order and No. 4, assisted by No. 3, prepares the requisite number of bombs if he has not already done so. When No. 4 has reported that the rounds are ready, No. 1 reports "On". The first bomb is passed up and fired as in paragraphs 1 and 2 above. No. 3 immediately takes another bomb from No. 4 and so on until he has passed up the number of bombs ordered. For the remaining rounds of the group, the order "Fire" is not given by the fire controller; therefore the No. 1 orders "On" and "Fire" relaying after each round until the rounds ordered have been fired. He removes and replaces the muzzle cover before and after each round.

4. Smoke.

When smoke is being fired, No. 4 will prepare and pass bombs to No. 3 without waiting each time for the order "On". No. 3 will pass them to No. 2 as soon as he is ready to receive them.

5. "... rounds—Rapid".

Mortar numbers act as taught in paragraph 3 above.

On receipt of the order "Fire" No. 1 orders "Fire" once only, the remaining bombs being passed up and fired as quickly as possible. If necessary No. 1 maintains elevation and direction by means of the elevating and traversing handles, but, should the mortar become badly displaced, he orders "Stop", relays the mortar and orders the fire to continue.

No. 1 will not replace the muzzle cover on the barrel until the rounds have been fired; Nos. 1 and 2 will then relay.

6. "... round groups—Rapid".

This order indicates that groups of rapid are to be fired without the number of rounds or the rate being repeated for each group. Nos. 1 and 2 relay after each group. Groups are normally of three, four, or five rounds.

7. "Stop".

No. 1 acknowledges the order and orders "Stop". He replaces the muzzle cover and, assisted by No. 2, relays the mortar. Should No. 2 have a bomb when the order "Stop" is received, he passes it back to No. 3 who replaces the safety cap and passes it back to No. 4.

Bombs will be passed back-vanes foremost.

NOTES:—

Prepared rounds will not be left in the open, but will be returned to the bomb carriers until required by No. 3.

LESSON 23.—ACTION AND CEASE FIRING

Instructor's notes

Before ordering action the instructor will order a charge and range, indicate an aiming mark and a position for the base plate.

1. "No. . . . Detachment, Charge . . . , . . . Hundred, action".

The detachment performs the duties laid down in Lessons 14 and 19 with the following exceptions:—

No. 1 sets the range scale slider at the charge and range ordered instead of Charge 2—800 yards and he positions the bipod so that the elevation can be obtained without further movement during the laying.

2. "Cease firing".

The detachment performs the duties laid down in Lesson 22 (7) and in Lesson 15. In addition, No. 4 replaces any secondary cartridges he may have removed, re-ties the tail-unit covers of all prepared bombs, and secures the carriers.

LESSON 24.—CONTROLLED CORRECTIONS

1. To execute an order correcting the range when firing. "... hundred".

No. 1 acknowledges the order, adjusts the range scale slider to the range ordered and, assisted by No. 2 relays in the normal manner.

2. To execute an order correcting direction when firing. "Right (or left) . . . degrees".

No. 1 acknowledges the order, adjusts the deflection drum to the figure ordered and, assisted by No. 2, relays in the normal manner.

3. Practise squad.

NOTE.—When a correction is necessary to both elevation and direction, the correction to direction will not be ordered until No. 1 has acknowledged the new range.

LESSON 25.—RAPID CORRECTIONS

1. “Check turns”.

This order implies that rapid correction *may* be necessary during the shoot and therefore all necessary arrangements must be made in order to alter elevation and direction rapidly. This preparation is carried out as follows:—

- i. *For elevation.*—No. 1 adjusts the sight up 100 yards and relays for elevation. He counts the number of times that the operating handle is completely turned during this relaying. He reports the number of turns, adjusts the sight to the original range, relays the mortar and reports “On”.
- ii. *For direction.*—One half turn of the traversing handle gives one degree of traverse.

2. “Rapid corrections”.

This order indicates that rapid corrections *will* be used during the shoot and that therefore all corrections to elevation and direction will be made by means of the elevating and traversing handles without reference to the sight.

3. To execute corrections.

i. *For range.*

“Up (or down) . . . hundred (or fifty)”.

No. 1 puts the elevation on the mortar using the operating handle only; he then reports “On”.

ii. *For direction.*

“Right (or left) . . . degrees”.

No. 1 deflects the mortar, using the traversing handle only; he then reports “On”.

4. “. . . Round groups—Rapid”.

The procedure is the same as for Lesson 22. paragraph 5, except that, when this order is given during rapid corrections, Nos. 1 and 2 do not relay after each group.

NOTE.—When a correction is necessary to both elevation and direction, the correction to direction will not be ordered until No. 1 has acknowledged the new range.

LESSON 26.—ACTION ON MISFIRE

No. 1 reports “Misfire”.

1. “Stand clear”.

This order is given as soon as No. 1 has reported “Misfire”. The detachment falls in in rear of the mortar.

1. “For misfire, Take post”.

This order is given after a pause of one minute following “Stand clear”.

No. 1 stands in rear of the base-plate.

No. 2 faces inwards on the right of the barrel.

No. 3 faces inwards on the left of the barrel.

No. 4 assumes his normal position.

3. “Unload misfire”.

No. 1 removes the recoil spring from the cradle and turns the barrel to the unlocked position in the base-plate. He then raises the barrel and allows the bomb to slide slowly forward.

No. 2 places his hands round the muzzle and catches the bomb as it slides from it.

No. 3 steadies the bipod to prevent the cradle from sliding forward. He resumes the firing position when the recoil spring has been attached.

(The misfire may be caused by a faulty primary cartridge, or by the presence of fouling or the remains of a previous primary cartridge on the striker.)

No. 2 examines the primary cartridge and watches for fouling to fall out of the barrel.

If the primary cartridge is correct, and no fouling has been seen to fall out of the barrel, No. 1 unscrews the breech piece and examines the striker before replacing the barrel.

In other cases No. 1 re-assembles the mortar, and assisted by No. 2, relays. No. 2 passes the bomb vanes foremost to No. 4, who replaces the safety cap.

As soon as the mortar has been relayed, No. 1 reports “On” and, unless otherwise ordered, “Fire”.

SECTION 17.—TESTS OF ELEMENTARY MORTAR DRILL

Instructor's notes

Stores:—Mortar complete. 2 carriers full of bombs.

1. The tests have been devised to assist the platoon commander in testing the efficiency of his N.C.Os., and men in elementary mortar drill.

2. Respirators will be worn for all tests, the order "GAS" being given before the executive command which starts the timing for the test.

3. In Tests 2, 3, and 4, the No. 1 only is being tested, but in Tests 1 and 5, Nos. 1, 2, and 3 are all being tested. A N.C.O. or man has therefore nine tests to complete, which are as follows :—

In the duties of No. 1 ... 5 tests ... All tests.
In the duties of No. 2 ... 2 tests ... Tests 1 and 5.
In the duties of No. 3 ... 2 tests ... Tests 1 and 5.

4. Any action carried out contrary to the lessons taught in Section 16 constitutes a failure by that man in that test.

5. The standard of qualification is as follows :—

Tests 1 and 5 ... No mistakes.
Tests 2, 3, and 4 ... A total of one mistake.

6. The timing in all tests applies to the testing of the No. 1 only, but he should not be failed when, owing to the fault of Nos. 2 or 3, he exceeds the time limit. He should be retested.

Men who are accurate, but who slightly exceed the standard time, should be tested again before being put back for further instruction.

7. Time will be saved in conducting the tests if men are tested in groups of four and all five tests are carried out consecutively. On completion of the fifth test the order "FALL OUT 1" should be given and respirators may be removed for a short time before the tests are repeated with the men in their new positions.

8. The platoon commander will keep a record of the tests, for which purpose the specimen form on page 31 is suggested.

TEST 1.—ACTION

Nos. 1, 2, 3, and 4 take post and report stores as for Lesson 13, the instructor inspecting the stores after "Take post" has been completed. An aiming mark and base-plate position is indicated to the No. 1 and the order "Gas" is given.

"No. . . . Detachment, Charge . . . , . . . hundred, Action".

Rank	Name	Duties of No. 1					Duties of No. 2		Duties of No. 3		Number of failures	Qualification
		Test 1	Test 2	Test 3	Test 4	Test 5	Test 1	Test 5	Test 1	Test 5		
Cpl.	White	P	P	P	P	F	P	P	P	P	1	F
Cpl.	Evans	P	P	F	P	P	P	P	P	P	1	Q

P = Passed. F = Failed. Q = Qualified.

The time is taken from the command "Action" until the bomb has reached No. 2 and all numbers are still.

Standard time : 60 seconds.

TEST 2.—FIRE

No. 1 is laid on the aiming mark.

"Fire".

Nos. 1 and 2 act as in Lesson 22.

The time is taken from the order "Fire" until No. 1 reports **"On"**.

Standard time : 12 seconds.

TEST 3.—CONTROLLED CORRECTIONS

No. 1 is laid on the aiming mark.

A correction is ordered for elevation and direction, the former not to exceed 200 yards and the later 4 degrees.

"... hundred, Right (or left) ... degrees".

The time is taken from the order "hundred" until No. 1 reports **"On"**.

Standard time : 25 seconds.

TEST 4.—RAPID CORRECTIONS

Conditions as for Test 3, but "Check turns" will have been carried out and the sight set at 1,000 yards.

"Up (or down) ... hundred, right (or left) ... degrees".

The time is taken from the order "hundred" until No. 1 reports **"On"**.

Standard time : 10 seconds.

A total of three tests, at the end of which an error of 30 minutes is allowed for direction and 25 yards for elevation.

TEST 5.—CEASE FIRING

All bombs will be in carriers and carriers secured before the test begins.

"Cease firing".

The numbers act as in Lesson 23 (2).

The time is taken from the order "Firing" until Nos. 1, 2, and 3 are still.

Standard time : 20 seconds.

SECTION 18.—PACKING THE VEHICLE

LESSON 27.—TO PACK THE VEHICLE

Instructor's notes

Stores :—

Mortar complete with box.

Oil can.

Tools.

Carrying harness.

Clinometer and case.

Cleaning rod.

Brass scrubber.

Aiming lamp and box.

Camouflage.

40 bomb carriers.

The packs of the detachment and driver.

2 aiming posts.

Torch.

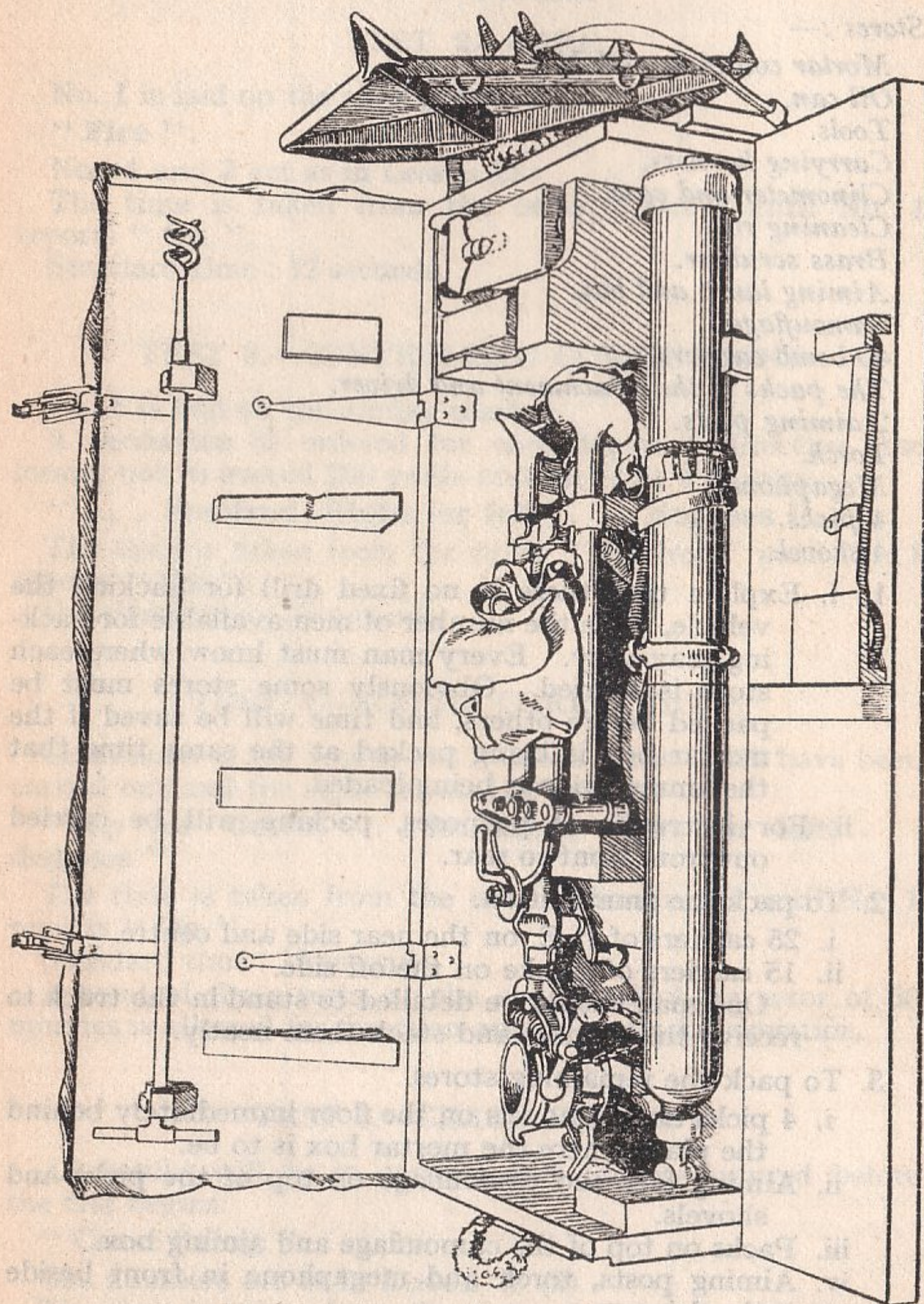
Megaphone.

4 picks.

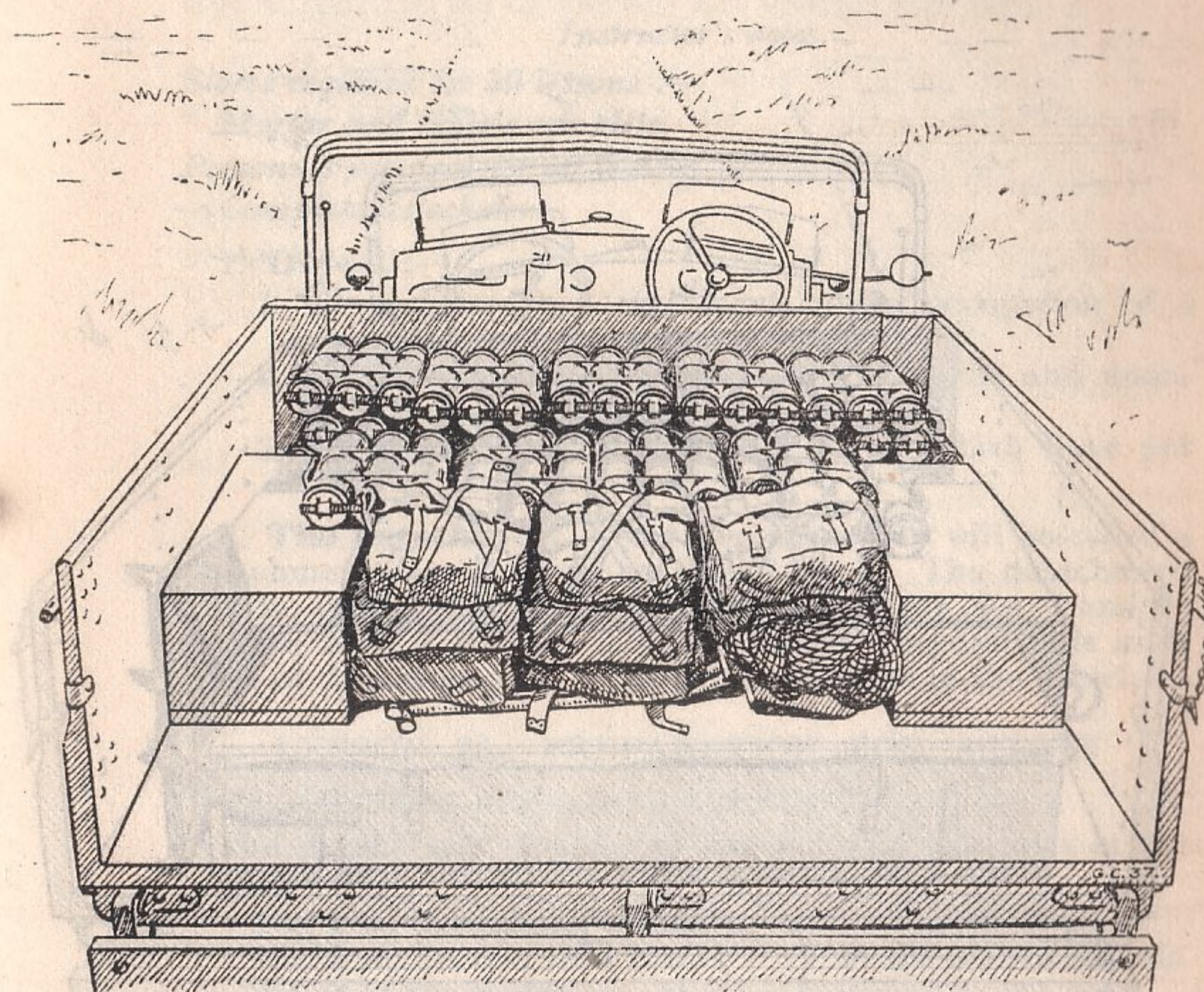
4 shovels.

1. i. Explain that there is no fixed drill for packing the vehicle, since the number of men available for packing may vary. Every man must know where each store is carried. Obviously some stores must be packed before others, and time will be saved if the mortar box is being packed at the same time that the ammunition is being loaded.
 ii. For instructional purposes, packing will be carried out from front to rear.
2. To pack the ammunition.
 - i. 25 carriers of H.E. on the near side and centre.
 - ii. 15 carriers of smoke on the off side.
 One man should be detailed to stand in the truck to receive the carriers and stack them neatly.
3. To pack the remaining stores.
 - i. 4 picks and 4 shovels on the floor immediately behind the place where the mortar box is to be.
 - ii. Aiming box and camouflage on top of the picks and shovels.
 - iii. Packs on top of the camouflage and aiming box.
 - iv. Aiming posts, torch and megaphone in front beside the driver.
 - v. Driver's pack, beside the driver.
 - vi. Driver's rifle, in the off-side rifle rack.

THE MORTAR BOX PACKED

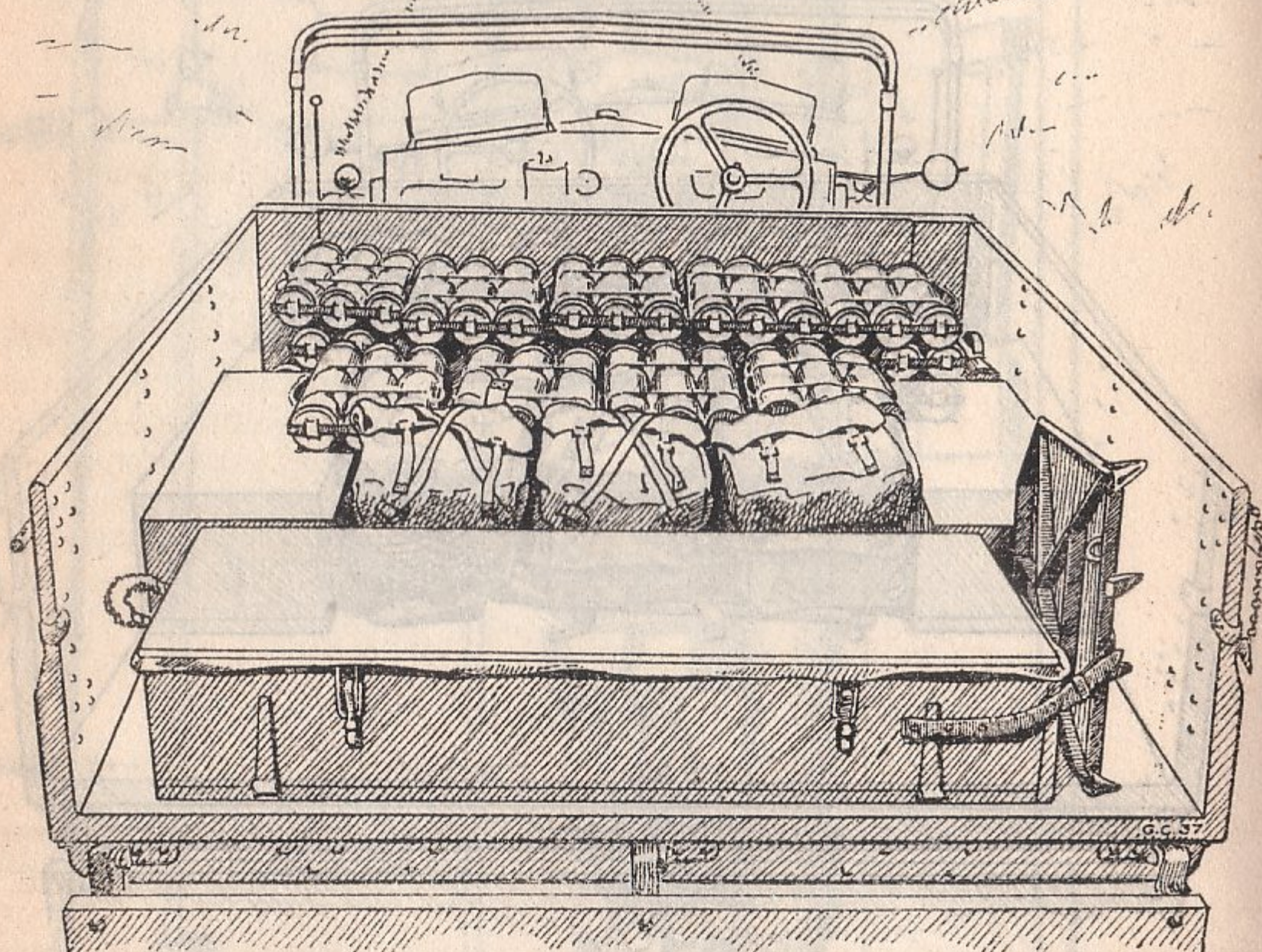


VEHICLE PACKED (WITHOUT BOX)



NOTE.—The night aiming box is hidden by camouflage material.

VEHICLE PACKED (WITH BOX)



4. To pack the box.
 - i. Stores and accessories as shown in Plate VII.
 - ii. Carrying harness.
 - iii. Barrel and spare parts bag.
 - iv. Bipod.
 - v. Base-plate and sight in case.

SECTION 19.—DETACHMENT DRILL (DAY)*Instructor's notes*

Stores required for all lessons :—

Mortar and vehicle complete.

Personnel required for all lessons :—

Complete detachment.

1. Object :—

1. To exercise the detachment in the occupation of a position from a position of readiness.
2. To exercise the numbers in fire discipline and maintenance of the mortar in action.
3. To teach those duties of the driver which have not already been taught.

2. The detachment.—Any four men, who will be called a detachment, are told off as Nos. 1 to 4. The detachment falls in, in file, in front of the vehicle : right file Nos. 1 and 3 ; left file Nos. 2 and 4. The detachment corporal falls in in front of the leading file. The driver is seated in the vehicle.

LESSON 28.—PREPARATION FOR ACTION

“ . . . Cases—Prepare for action ”.

The detachment doubles to the following positions at the vehicle :—

- | | |
|--|---------------------------|
| No. 1 at the rear off corner. | } in the rear of vehicle. |
| No. 2 at the rear near corner | |
| No. 3 in the centre. | |
| No. 4 on the near side at the rear corner. | |
| The driver on the off side at the rear corner. | |

No. 3 unties the ropes of the cover, Nos. 1, 2, 4 and the driver loosen the ropes from the hooks and No. 4 and the driver roll back the cover to the front of the vehicle.

Nos. 1 and 2 drop the tail board and No. 3 opens the mortar box and drops the front.

No. 1 removes the sight case and base-plate and doubles the front clear of the vehicle.

No. 2 removes the spare parts bag.

No. 3 removes the bipod and doubles to his place in rear of No. 1.

No. 2 removes the barrel and doubles to his place on the right of No. 1.

No. 4 drops the side of the vehicle.

The driver moves to the near side.

No. 4 and the driver remove the number of bomb carriers ordered, they then square off the vehicle and replace the cover.

No. 4 takes two carriers and doubles to his position in rear of No. 3.

The driver takes the remaining carriers and doubles to a position in rear of No. 4. The number of journeys he makes depends on the amount of ammunition ordered.

If smoke is ordered, No. 4 and the driver each drop their respective sides of the vehicle. No. 4 removes one carrier of H.E. and then moves over to assist the driver in removing the necessary amount of smoke; he takes forward one carrier of H.E. and one of smoke.

LESSON 29.—PREPARATION FOR ACTION (LONG CARRY)

1. The procedure is the same as for Lesson 28, with the following additions:—

i. Nos. 1, 2, and 3 each take their carrying harness from the box in addition to their other stores.

ii. The detachment corporal details ammunition loads according to the amount of ammunition ordered and the length of carry.

2. It is impossible to lay down the loads for a long carry and this duty must be left to the detachment corporal. It should never be less than four carriers for the initial carry and should usually be more. Loads may be changed during the carry and the following are often available to assist in addition to the normal mortar numbers:—

Detachment corporal, orderly and range-taker.

LESSON 30.—ACTION

“No. . . . Detachment, Charge . . . , . . . hundred, action”.

Nos. 1, 2, 3, and 4 act as in Lesson 23.

The driver stacks the carriers in a convenient position for the handling of the ammunition by Nos. 3 and 4, and returns to the vehicle.

NOTE.—While the detachment is in action, all methods of laying should be practised.

LESSON 31.—CEASE FIRING

1. “Cease firing”.

When this order is given, the signal for the vehicle is made. Nos. 1, 2, 3, and 4 act as in Lesson 23. No. 4 removing all bomb carriers from the position.

The detachment corporal and the driver move with the vehicle to a position in rear of No. 4. They prepare it by removing the cover and lowering the tail board.

2. “On vehicle”.

No. 1 replaces the base-plate and the sight case.

No. 2 replaces the barrel.

No. 3 replaces the bipod.

No. 4 and the driver replace the bomb carriers and secure the tail board.

Nos. 3, 4, and the driver replace the vehicle cover.

When each number has completed his task, he falls in in front of the vehicle in the position which he originally occupied.

NOTE.—On no account will the barrel be used to lever the base-plate out of the ground. This will be done with a pick.

SECTION 20.—DETACHMENT DRILL (NIGHT)

Instructor's notes

Stores required for all lessons:—

Mortar and vehicle complete.

Personnel required for all lessons:—

Complete detachment.

The position will previously have been pegged and the line of fire marked out.

LESSON 32.—PREPARATION FOR ACTION

1. “For night firing, Prepare for action”.

The detachment carry out their duties as taught in Lesson 28, with the following exceptions:—

i. The orderly removes the aiming lamp and torch if not already taken for reconnaissance.

ii. The detachment fall in in single file in front of the vehicle.

2. The detachment commander plants the aiming lamp and the detachment corporal leads the detachment forward in single file towards the base-plate position.

3. "Action".

No. 1 positions the base-plate accurately between the pegs, supervised by the detachment commander.

Nos. 2, 3, and 4, when ordered, bring forward their stores and mount the mortar as taught in Lesson 14.

No. 1, assisted by No. 3, aligns the barrel on the lamp by means of the luminous strip on the barrel.

The N.C.O. on the position assists Nos. 1 and 2 to lay the mortar by the use of his torch.

When No. 1 reports "On", the N.C.O. checks the elevation and direction.

In all relaying the N.C.O. must assist by the use of his torch.

LESSON 33.—CEASE FIRING

1. "Cease firing".

The detachment carry out their duties as taught in Lesson 31, with the following exceptions:—

- i. A verbal order or message is given for the vehicle.
- ii. The orderly collects the aiming post, aiming lamp and torch.

2. "On vehicle".

The detachment carry out their duties as taught in Lesson 31, paragraph 2, with the following exceptions:—

- i. The orderly replaces the aiming post, aiming lamp and torch in the vehicle.
- ii. On completion of their duties the detachment fall in in single file in front of the vehicle.

SECTION 21.—ADVANCED HANDLING

LESSON 34.—ADVANCED HANDLING

Instructor's notes

Stores:—

Packed vehicle complete.

Personnel:—

Complete detachment, and, if available, range-taker.

Note the mistakes made and point them out at the appropriate time without interfering with the work of the detachment.

Never end the lesson with the mortar in action; always insist on all arrangements being completed for the next move under service conditions.

When the ground is suitable, and sand-filled bombs are available, they may be fired in this lesson to add reality to the drill of the mortar.

1. Explain:—

- i. That the object of the lesson is to exercise the whole detachment and the range-taker in their duties from the moment when the task is given to the detachment commander until the mortar and stores are back on the vehicle before advancing or retiring to the next task.
- ii. That, although the lesson is to be conducted in the barrack area, full use will be made of cover from view and fire.
- iii. That the position now occupied by the vehicle is the position in readiness and that movements of the detachment and vehicle before arriving in this position will be dealt with on detachment exercises in the field.

2. Selection of the observation post and mortar position.

- i. The detachment commander, his orderly and, if available, the range-taker should be taken to a suitable view point from which the tactical situation and the task can be described.
- ii. Allow the exercise to run until No. 1 reports "On".
- iii. Comment on the following:—
 - (a) Observation post and mortar to position selected.
 - (b) Use made of, and orders to the range-taker.
 - (c) Procedure of orderly and detachment corporal.
 - (d) Method of obtaining direction.
 - (e) Method of control.
 - (f) Use of cover.
 - (g) Movement of the detachment forward under the corporal or orderly.
 - (h) Distributing of loads.
 - (i) Drill on coming into action.
 - (j) The charge and range ordered.

3. Engagement of targets.

- i. Give the fire controller various types of target introducing smoke and safety problems and, during their engagement, exercise the detachment on the following subjects:—
 - (a) Ammunition supply.
 - (b) Gas.
 - (c) Casualties.
 - (d) Misfire.

ii. Comment on :—

- (a) Method of engagement of target.
- (b) Control.
- (c) Fire discipline.

4. The move to the next task.

i. Give the fire controller his next task.

ii. Comment on :—

- (a) The drill for the order "Cease firing".
- (b) The drill for the order "On vehicle" and the packing of the truck or the arrangements made for a long carry.
- (c) The use of cover.
- (d) The orders to the detachment corporal for the move.

BATTLE PROCEDURE

SECTION 22.—SELECTION OF DETACHMENT POSITIONS

LESSON 35.—RECONNAISSANCE FOR DETACHMENT POSITIONS

Instructor's notes

Stores :—None.

The instructor will take the squad to various areas which have been previously reconnoitred. On arrival in each area he will give the brief tactical picture and mortar task and the squad will select the detachment position in detail.

1. A detachment position consists of an observation post (O.P.), a mortar position, a position in readiness, and a position for the vehicle whilst the mortar is in action.

It will be selected by the detachment commander, who will often be given assistance by the mortar platoon commander, or by the company commander under whose orders he has temporarily been placed.

2. Concealment of the mortar is as important as the concealment of other weapons but, since the essence of mortar support is speed in carrying out the task, detachment commanders must be prepared to forgo positions which offer the best concealment in order to produce fire as quickly as possible. Positions should be selected as near as possible to the headquarters of the commander under whose orders the detachment is placed.

3. The observation post should fulfil the following conditions :—

- i. Have a view of the area all round the target.
- ii. Be within voice control of the mortar.
- iii. Have good view of our own troops and the ground over which they are to advance.
- iv. Have cover from fire or cover from view.
- v. Have a covered approach.
- vi. In the case of long control, have sufficient cover to enable signals to be made.

4. The mortar position should be sited so that :—

- i. There is an unrestricted path for the flight of the bombs.
- ii. The ground is suitable for the base-plate.

- iii. The mortar numbers are under cover from fire and view.
- iv. There is a covered approach to it.

5. The position in readiness should be:—

- i. Be sited where the vehicle can reach it and turn round.
- ii. Be as near as possible to the mortar position.
- iii. Be concealed.

The ideal position in readiness is thus at the mortar position itself.

In order to avoid the delay and exhaustion caused by a long carry, and the difficulties of controlling the movements of the vehicle once it is left behind, detachment commanders must be bold in the selection of the position in readiness, and the vehicle will often have to cross open country at speed on its way forward.

6. The position of the vehicle should be:—

- i. Concealed from ground and air observation.
- ii. Within hailing distance of the mortar.

The vehicle may often be left at the position in readiness.

SECTION 23.—OCCUPATION OF A POSITION (DAY)

LESSON 36.—PROCEDURE BEFORE AND DURING OCCUPATION

Instructor's notes

Stores:—

Sand table.

The procedure should be demonstrated on the sand table in full and repeated in order to show which parts may be dispensed with in accordance with the situation. Before conducting exercises in the field the instructor should repeat this lesson on the sand table by making the squad describe the procedure, and give the necessary orders while he moves on the sand table in accordance with those orders.

1. Procedure before the mortar task has been given:—

i. Platoon commander.

The platoon commanders' normal place is at or near battalion headquarters, ready to accompany the battalion commander on reconnaissance, to give him technical mortar advice, or to receive his orders.

When the battalion commander's orders have been issued, he is responsible for moving his platoon by a correct route to a rendezvous, or for allotting his detachments to companies and ensuring contact between the detachments and the company commanders. He decides how the range-taker is to be employed.

When his whole platoon is placed under the orders of a company commander, he moves with the company commander, having given orders to the senior detachment commander as to the disposition of the platoon.

ii. Detachment commander.

When placed under command of a company, he moves with the company commander, accompanied by his orderly, with a view to engaging targets as required. He details a line of advance which will bring the detachment forward in close touch with company headquarters.

In deciding whether the truck is to accompany the detachment during each successive move, or whether the detachment will be required to manhandle the mortar and ammunition, he will be guided by the considerations that the truck is vulnerable; that once the truck is left behind, it is difficult to collect it again; that a long carry is slow and exhausting for the detachment; that only enough ammunition for one short shoot can be carried; and that the nature of ammunition carried must be decided before the task is known.

iii. Detachment corporal.

In the absence of the detachment commander, he moves the detachment forward in accordance with orders, keeping it in close touch with company headquarters, and making arrangements for local protection.

2. Procedure when the mortar task has been given:—

i. Platoon commander.

Mortar detachments will normally be under the command of companies. The platoon commander assists detachment commanders in their reconnaissance, when possible, and keeps the commanding officer informed as to their location. He commands those detachments which are temporarily held in battalion reserve, and arranges the chain of supply to detachments allotted to companies.

ii. Detachment commander.

NOTE.—The procedure described below deals with the case in which the detachment is some distance from the detachment commander when he is given his task, and in which he is not pressed for time. Commanders must learn to dispense with such parts of the procedure as the circumstances demand.

- (a) He finds out the position of our own troops, the nature of the target and the type of fire and ammunition required, and estimates the amount of ammunition necessary.
- (b) He reconnoitres for a detachment position, and decides on the methods of control and of obtaining direction.
- (c) As soon as he has decided on the position in readiness, he sends his orderly to the detachment with orders to lead it to the position in readiness and to send forward the detachment corporal to join him. He also tells the orderly the amount and type of ammunition to be off loaded at the position in readiness.
- (d) As soon as he has decided roughly on the position of his O.P. he issues orders to the range-taker (if present) including the following :—
 Any points on which ranges are required.
 Time available.
 Approximate position of the O.P.
- (e) On the arrival of the detachment corporal, he gives him orders as follows :—
 Information and intention.
 Charge and range.
 Exact mortar position.
 Position of observation post and method of control.
 Position in readiness.
 Amount and type of ammunition.
 The position to which the vehicle is to go after unloading.

NOTE.—Time may sometimes be saved if the orderly orders the detachment to prepare for action whilst the detachment commander gives orders to the detachment corporal.

iii. Detachment corporal.

- (a) If present when the detachment reaches the position in readiness, he orders the preparation for action and details ammunition loads.
- (b) If not present when the detachment reaches the position in readiness, he checks all stores at the first opportunity and leads the detachment forward towards the base-plate position.
- (c) He shows the vehicle driver the position to which he will return when signalled for and sends the vehicle to the covered position selected by the detachment commander.
- (d) When the observation post is beyond voice control, he mounts the mortar if ordered to do so by the detachment commander.

LESSON 37.—PROCEDURE IN ACTION

Instructor's notes

Stores :—

Sand table.

1. Platoon commander.

- i. He places himself where he can best carry out the orders of his commanding officer.
- ii. He sends any fire direction orders required.
- iii. He regulates the supply of ammunition to his detachment.
- iv. He controls the intake and outflow of detachments to and from the battalion reserve.
- v. Should his whole platoon be under the command of one company commander, he remains at that company headquarters and ensures that the demands made by the commander are met.

2. Detachment commander.

- i. He keeps in touch with the tactical situation.
- ii. He controls the fire of his detachment.
- iii. He reports to his immediate commander his position, ammunition state, etc.
- iv. He carries out any fire direction orders received.
- v. He ensures that his fire does not endanger our own troops.
- vi. He makes arrangements to continue firing in case observation is at any time interrupted.
- vii. On completion of his task, he at once regains touch with his immediate commander with a view to affording further support.

3. Detachment corporal.

- i. He supervises the supply of ammunition from the vehicle to the mortar position.
- ii. He organizes communication between the mortar position and the vehicle.
- iii. When the observation post is beyond voice control he commands at the mortar position.

SECTION 24.—OCCUPATION OF A POSITION (NIGHT)

LESSON 38.—DAYLIGHT RECONNAISSANCE

Instructor's notes

Stores :—

- 2 pegs.
- 2 aiming posts.
- 1 digging tool, compass, tape.

1. The reconnaissance party.

This consists of the detachment commander, the range-taker if available, and one other, preferably the orderly, and the stores taken are :—

- i. Two pegs to mark the base-plate position.
- ii. Two aiming posts to mark the line of fire, one of these posts to be fitted with the bracket to hold the aiming lamp.
- iii. One digging tool to prepare the base-plate position if necessary.

2. **Procedure.**—Having received orders as to his task, the detachment commander selects a mortar position and then plants two aiming posts accurately in line with the target or aiming mark. The post to hold the aiming lamp will not be more than 20 paces from the mortar position.

Having prepared the base-plate position, if necessary, he now plants the base-plate pegs accurately in line with the aiming posts. These pegs mark the base-plate position and it is between them that the No. 1 puts the base-plate when he arrives after dark; they must, therefore, be sufficiently far apart to allow for this.

Before leaving the position the detachment commander :—

- i. Estimates, or orders the range-taker to take the range of the target.

- ii. Takes a compass bearing of the direction of the aiming posts from the base-plate position.
- iii. Selects a rendezvous
- iv. Selects a position in readiness } To coincide where possible.
- v. Reconnoitres the route from the position in readiness to the mortar position and marks this route with tape if necessary.
- vi. Makes all necessary arrangements for occupation after dark.

3. **Practice.**—The instructor will demonstrate the duties and the squad will practise.

LESSON 39.—NIGHT OCCUPATION

Instructor's notes

Stores :—

Mortar complete, aiming lamp and torch.

Personnel :—

Detachment complete.

This lesson should be carried out under cover of darkness, and the position occupied should be the one previously reconnoitred in Lesson 38. All the usual precautions with regard to silence and the exposure of lights will be taken.

1. **Procedure.**

i. Detachment commander.

He leads the detachment to the position in readiness and then takes the orderly forward, with the aiming lamp, to the mortar position. He plants the lamp on the aiming post and orders the orderly to return to the position in readiness and guide the detachment forward.

On arrival of the detachment he takes command and the position is occupied as taught in Detachment Drill (Night). At the first opportunity he gives all information to the detachment corporal.

ii. Detachment corporal.

On arrival at the position in readiness he orders "Prepare for action", checks all stores carefully and waits for the order to move forward. He moves the detachment forward guided by the orderly.

SECTION 25.—SPECIAL PROCEDURE

LESSON 40.—PROCEDURE IN DEFENCE

Instructor's notes

Stores :—

Sand table.

1. Procedure on a decision to occupy a position.

The platoon commander's orders will include :—

- i. The detachment area and task for each detachment.
- ii. Position of our own troops in the vicinity of the detachment area.
- iii. Amount of ammunition to be off-loaded and the amounts to be earmarked for the counter-attack task and/or the call for defensive fire.
- iv. Signal for defensive fire and the direction from which it will be put up.
- v. Rates of fire on the call for defensive fire.
- vi. Any special orders for local protection and concealment.
- vii. Orders as to digging.
- viii. Alternative positions.
- ix. Place to which vehicles are to be sent when the position has been occupied.
- x. Communications.

He gains touch with the infantry and machine gun sub-units in the vicinity of the detachment and makes arrangements for local protection, liaison, and the solving of safety problems.

2. Procedure in the occupation of a position.

i. Platoon commander.

He supervises the work of the detachments, organizes communications and platoon headquarters and reports to his commanding officer when all arrangements are complete.

ii. Detachment commander.

On arrival at the position, he :—

- (a) Orders the mortar to be mounted and laid on its first task in the normal manner, and ensures that it can be fired under all conditions of light.
- (b) Prepares, or orders the range-taker to prepare, a range card.
- (c) Posts a sentry.

- (d) Arranges for local protection and concealment.
- (e) Instructs all ranks as to the signal for defensive fire, the direction from which it is to be sent up and the action on receipt of the signal.
- (f) Organizes the digging.
- (g) Informs the detachment corporal where to send the vehicle.
- (h) Sends the orderly to platoon headquarters to report the detachment in position.
- (i) Obtains full details regarding the counter-attack task.
- (j) Ensures that all ranks have full information.
- (k) Makes out a sentry and duty roster for day and night.
- (l) Gains touch with the companies in the immediate vicinity and ascertains details of patrols.

iii. Detachment corporal.

He orders all the stores and the correct amount of ammunition to be unloaded from the vehicle and placed near the mortar. He then sends the vehicle to its rear position.

LESSON 41.—SPECIAL PROCEDURE IN REAR GUARD ACTIONS

Instructor's notes

Stores :—

Sand table.

1. Procedure during the occupation of the position.

i. Platoon commander.

- (a) He disposes the detachments in accordance with the orders of his commanding officer and arranges with the commanders of forward companies the rendezvous to which the the detachments allotted to them shall proceed.
- (b) He informs detachment commanders from whom they will receive the order to withdraw.
- (c) He arranges to send a mortar representative to report to the officer detailed to reconnoitre the rear position.

ii. Detachment commander.

In selecting the detachment position he should bear in mind the facilities which it affords for quick and covered withdrawal.

2. Procedure in action.

i. Platoon commander.

He organizes a platoon rendezvous near the battalion headquarters at which he collects detachments withdrawing with the forward companies, refills them with ammunition and despatches them on their next task.

ii. Detachment commander.

(a) Before withdrawal, he orders the detachment corporal to reconnoitre the line of withdrawal.

(b) He issues preliminary orders regarding :—

i. The line of withdrawal.

ii. The next task and rendezvous.

3. Procedure on withdrawal.

i. Detachment commander.

On receipt of the order to withdraw, he gives it personally to the detachment, and when clear of the position, he joins the commander whom he is supporting.

ii. Detachment corporal.

He orders the vehicle to the pre-arranged position and turns it round. He then orders the driver to take up any extra ammunition that may be required before the final withdrawal from the position. He leads the detachment to the rear by the reconnoitred route.

SECTION 26.—PREPARATION FOR THE BASE-PLATE AND ENTRENCHING

LESSON 42.—PREPARATION OF THE BASE-PLATE POSITION

Instructor's notes

Stores :—

1 shovel.

Sandbags.

Base-plate.

1. Explain :—

That the spikes on the base-plate are so designed that the mortar will remain steady under practically all conditions, but that there are the three following exceptions when it is advisable to prepare the base-plate position before firing :—

i. Very long grass or corn which forms a cushion under the base-plate, preventing the spikes from gripping the earth.

ii. Very springy ground such as moss or heather.

iii. Very spongy ground.

2. Remedies.

Case i. above ... Remove the obstruction.

Case ii. above ... Take off the top surface with the shovel.

Case iii. above ... Place sandbags underneath the base-plate.

3. Demonstration.

Demonstrate the remedies given in paragraph 2, above.

LESSON 43.—THE MORTAR EMPLACEMENT

(See Plate X)

Instructor's notes

Stores :—

4 picks.

4 shovels.

4 pegs.

Marking tape.

The instructor will peg out the emplacement in accordance with the measurements given in Plate X and detail the squad to their tasks, ensuring that thrown up earth is camouflaged as the work progresses.

Explain :—

i. That, when the order is received to dig in the mortar, the emplacement dug should hold :—

The mortar complete.

Nos. 1, 2, and 3.

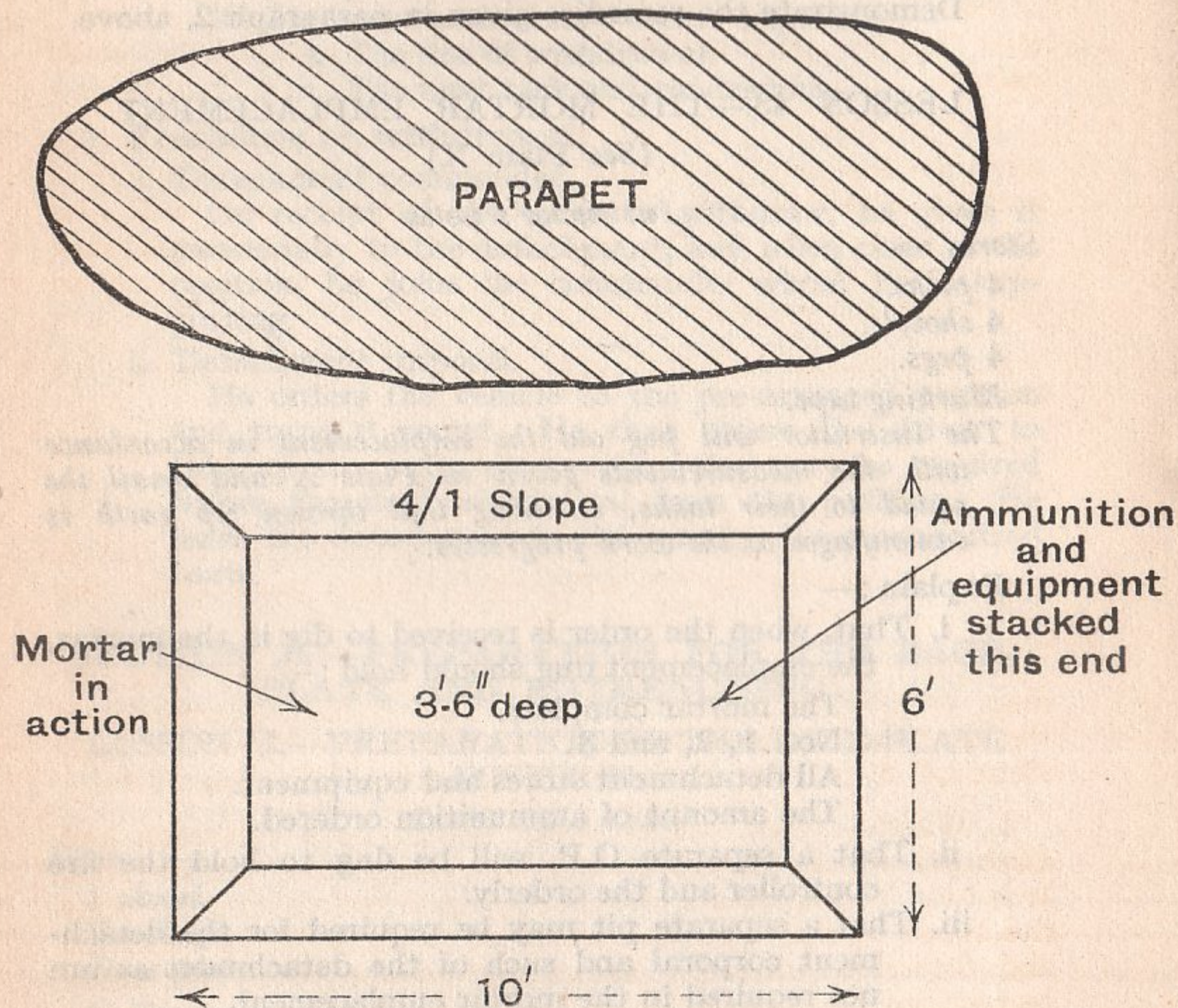
All detachment stores and equipment.

The amount of ammunition ordered.

ii. That a separate O.P. will be dug to hold the fire controller and the orderly.

iii. That a separate pit may be required for the detachment corporal and such of the detachment as are not required in the mortar emplacement.

THE MORTAR EMPLACEMENT



FIRE CONTROL

SECTION 27.—GENERAL

LESSON 44.—FIRE CONTROL—GENERAL

Instructor's notes

This subject must necessarily take the form of a lecture ; it is therefore given as headings, on which the instructor should enlarge.

1. The object of mortar fire is to assist the movement of our own troops by neutralizing the enemy fire. This role is entirely offensive and speed is the first essential, since the quick production of fire may often be of more importance than extreme accuracy, and time saved may well result in the saving of casualties to our own troops.

2. The mortar fire unit will always be the detachment for the following reasons :—

- i. A single mortar produces a great volume of fire without stoppages or excessive overheating.
- ii. A single mortar is easy to conceal.
- iii. Mortars must be ranged separately and it is not satisfactory to attempt to range more than one mortar at a time.

3. The range may be determined by range-finder, from the map, or by judging distance. The use of the range-finder is the most accurate method. Stress the importance of a high standard of judging distance among mortar fire controllers.

4. **Wind.**—Wind causes variations to both elevation and direction which, in the former, are sometimes considerable. It is only by experience that fire controllers can learn to judge the speed of the wind and apply it to the opening elevation and direction ordered. Errors due to the wind can easily be rectified by observation of the fall of the round.

5. **Beaten zone.**—If a succession of rounds is fired from a mortar laid each time at the same elevation and line, those rounds will not fall on the same spot. This is due to :—

- i. Slight variations from standard in the manufacture of the bomb and charges.
- ii. Slight variations in the muzzle velocity caused by the clearance between the bomb and the barrel.

- iii. Irregular movements of the air in the path of the bomb.
- iv. The degree of accuracy of the instruments, which have to be suitable for use in the field.

If, however, a large number of rounds is fired, they will all fall in an area which is approximately a rectangle, called the 100 per cent. beaten zone. (ABCD in Fig. 1.)

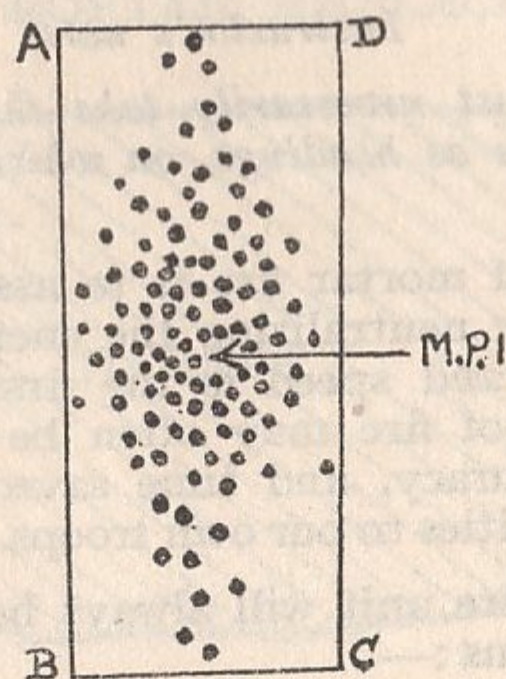


Fig. 1

Explain Fig. 1 on the blackboard.

The centre point of the 100 per cent. beaten zone is the mean point of impact (M.P.I.).

The approximate dimensions of the 100 per cent. beaten zone at all ranges are :—

		Charge I	Charge II
Length	... ..	100 yards.	160 yards.
Width	... ..	28 yards.	72 yards.

It will be seen that the bombs are thickest near the M.P.I. and on this fact are based the rules of ranging.

6. Fire orders.

(Instructor's Note.—Students will be given practice in giving fire orders during Ranging Instruction and Advanced Handling.)

The sequence of a fire order is as follows :—

- i. Designation "No. . . . Detachment."
- ii. Charge "Charge I (or Charge II)."
- iii. Range "... hundred."
- iv. The order to fire when No. 1 has reported "On"
... .. "Fire".

The above order pre-supposes that the mortar is already in action ; if this is not the case, the order "Action" will follow the range.

If smoke is required, the order "Smoke, Check turns" will be given after the range.

When more than one round is to be fired, the number of rounds will follow the range, *e.g.* :—

"Ten hundred . . . Three rounds".

or

"Ten fifty . . . Five rounds rapid".

SECTION 28.—METHODS OF OBTAINING DIRECTION

LESSON 45.—METHODS OF OBTAINING DIRECTION

Instructor's notes

Stores :—

2 aiming posts.

Graticuled glasses.

This lesson should be conducted out-of-doors, in a vicinity of mortar positions.

1. Emphasize the importance of concealing the mortar and its detachment, and explain when the mortar is concealed it is not usually possible to lay it direct on the target. Other means have, therefore, to be used for ensuring that the mortar is laid in the direction of the target. Errors in direction can normally soon be corrected after the fall of the first bomb, but in close country it will often be necessary to obtain accurate direction in the first instance, otherwise the fall of the first bomb may not be observed.

2. The following are the methods of obtaining direction :—

i. *Direct laying.*—For the reasons given above this method will not normally be considered. It is, however, possible on occasions to see the target through the cover (*e.g.* a hedge) without being visible from the target. In such direct laying has the advantages of speed and accuracy.

ii. *Modified direct laying.*—Instances may occur when, though the target is not visible to the layer, there is some prominent aiming mark above and in line with the target on to which the mortar may be laid.

iii. *Aiming posts.*—The fire controller crawls forward to a position from which the target is visible, and aligns the first post on the target, bearing in mind roughly

the position selected for the mortar. Then moving back towards the mortar position, he aligns the second post on both the first post and the target in such a manner that posts are visible from the mortar.

The mortar is then mounted and laid as taught in Lesson 20. This method is accurate, but slow, and entails exposed movement whilst planting the first post.

Often a natural object can be used instead of the first post.

- iv. *Auxiliary aiming mark*.—This should be at least 200 yards from the mortar position and be so situated that it is possible to measure the angle between it and the target from a position close to the mortar. It is unwise to select aiming marks to the right of the line mortar-target owing to the danger of obstruction by the barrel when the No. 1 tries to align the sight on the aiming mark.

The aiming mark is indicated to the No. 1 and the necessary angle "Right (or left) . . . degrees" is ordered. When the sight, set at this angle, is aligned on the aiming mark and Nos. 1 and 2 have completed the lay as taught in Lesson 21, the mortar is pointing at the target.

This method is safe, quick, and sufficiently accurate for normal purposes.

- v. *Rough laying*.—Good mortar positions should not necessarily be rejected because direction cannot be obtained in them by any of the above methods. Any rough method of alignment or even pure guess-work will often produce a direction sufficiently accurate for practical purposes.

SECTION 29.—ENGAGEMENT OF POINT TARGETS

The engagement of point targets consists of two processes :—

- i. *Ranging.*
- ii. *Firing for effect.*

LESSON 46.—RANGING (POINT TARGETS)

Instructor's notes

Stores :—

Blackboard.

This lesson should take the form of a lecture.

1. Ranging on to point targets is governed by a few simple rules which have been devised, as the result of experience,

to obtain the maximum effect on the target in the shortest time, and by firing as few bombs as possible.

2. The first step is to try to ensure that the target lies between two ranges. At first the distance between these two ranges will be 100 yards and the bracket thus obtained is termed the long bracket. By firing at intermediate ranges the target is next bracketed by two rounds differing in range by only 50 yards and this is termed the short bracket.

3. Example (on blackboard).

Estimated range to target	... ..	900 yards.
1st round at 900 yards falls	minus	} Long bracket
or short	... ..
2nd round fired at 1000 yards falls	plus	
or over	... ..
3rd round fired at 950 yards falls	minus ;	
the target is, therefore, presumably		
between 950 and 1000 yards, i.e.		
short bracket.		

4. In engaging point targets it is necessary to verify the short bracket, i.e. to fire it twice, in order to ensure that the target has indeed been bracketed. Time will be saved, therefore, if two rounds are ordered at the first elevation for the short bracket.

5. Example (on blackboard).

Estimated range to target	1100 yards.
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Round number	Range yards	Observation of burst	Fire controller's order	Remarks.
1	1100	plus	"Ten hundred"	To get long bracket.
2	1000	minus	"Ten fifty, two rounds"	Long bracket obtained, starting for short bracket with two rounds.
3	1050	minus	Nil	Short bracket obtained but not verified.
4	1050	minus	"Eleven hundred"	Bottom half of short bracket verified.
5	1100	plus	—	Short bracket verified.

6. **Contradictions**.—If, during bracketing, a contradiction (i.e. one round falling plus and one minus at the same range) is observed, then that range will be used for fire for effect, subject to the following provision :—

The range producing the contradiction must be supported above by a plus round fired at that range plus fifty yards, and below by a minus round at that range minus fifty yards.

7. Examples (on blackboard).

A.—Estimated range to target ... 1000 yards.

Round number	Range yards	Observation of burst	Fire controller's order	Remarks
1	1000	minus	"Eleven hundred"	To get long bracket.
2	1100	plus	"Ten fifty, two rounds"	Long bracket obtained, starting for short bracket with two rounds.
3	1050	plus	Nil	Short bracket obtained but not verified.
4	1050	minus	Fire for effect at 1050 yards	Contradiction at 1050 yards. It is supported above by a plus at 1100 yards and below by a minus at 1000 yards. Therefore fire for effect at 1050 yards.

B.—Estimated range to target ... 900 yards.

Round number	Range yards	Observation of burst	Fire controller's orders	Remarks
1	900	plus	"Eight hundred"	
2	800	minus	"Eight fifty two rounds"	
3	850	minus	Nil	
4	850	minus	"Nine hundred"	Bottom half of short bracket verified, now firing to verify top half.
5	900	minus	"Nine-fifty"	Contradiction at 900 yards supported below by 850 yards being minus but not yet supported above. Therefore fire at 950 yards to support above.
6	950	plus	Fire for effect at 900 yards	

8. In normal circumstances the opening elevation will be the estimated range to the target plus or minus any allowance for wind, but the nature of the country may influence the fire controller to depart from this procedure (see Lesson 51).

Bold corrections are essential during the early stages of ranging in order to obtain the long bracket in the shortest possible time.

9. At ranges below 800 yards, with good observation, and if the first ranging bomb falls reasonably near the target, the fire controller may go straight for the short bracket, which he must verify before firing for effect.

Estimated range to target ... 400 yards.

Shot No.	Range yards	Observation of burst	Fire controller's order	Remarks
1	400	plus	"Three fifty two rounds"	Long bracket unnecessary. Start to verify short bracket.
2	350	minus	—	
3	350	minus	"Four hundred"	Bottom half verified. Fire to verify top half.
4	400	plus	"Three seventy-five." Fire for effect.	Ranging completed in four rounds.

LESSON 47.—TO OBTAIN LINE DURING RANGING

*Instructor's notes**Stores :—**Rifle and rest.**Degree scale and one pair of graticuled binoculars per student.*

1. Errors in direction may be caused by the wind or by inaccurate laying; in the former case a correction may be possible before opening fire by deflecting the mortar to windward of the line of fire.

It is important that errors in direction should be corrected at once, since, during ranging, rounds may fall in such a way that they would have been effective on the target had they been correct for line.

2. Example.

Estimated range to target ... 900 yards, wind blowing left to right.

Shot No.	Range yards	Observation of burst	Fire controller's order	Remarks
1	900	Very short and 2° 40' to right of target	"Twelve hundred, left three degrees"	This shot is useless. Note bold correction for elevation and line.
2	1200	Plus	"Eleven hundred"	To obtain long bracket.
3	1100	Unobserved	"Eleven fifty two rounds, left one degree"	Fire controller heard the burst and assumed it was in dead ground short of target. Switch to avoid dead ground.
4	1150	Minus and 1° left	—	—
5	1150	Minus and 1° left	"Twelve hundred"	—
6	1200	Plus and 1° left	"Eleven seventy-five, right one degree." Fire for effect.	Short bracket verified, ranging completed. Put line correct.

3. **Measurement of lateral angles.**—Lateral errors can be measured by :—

- i. Hand angles.
- ii. Graticuled glasses.

On observing a round to fall incorrect for line, the lateral error is measured to the nearest 30 minutes and the necessary correction is ordered to the mortar.

Corrections for line may be made simultaneously with corrections for elevation.

4. **Hand angles** (See S.A.T., Vol. I, Pamphlet No. 2, 1937, Lesson 6).

- i. By using the degree scale painted on a wall ensure that every member of the squad determines the angles subtended by his own hand.
- ii. As these angles will normally be used in the lying position, each member of the squad should check his angles lying down.
- iii. Practise the squad in the measurement of lateral angles by the use of conspicuous objects on the landscape.

5. **Graticules.**

- i. Explain the horizontal angles represented between the graticules.
- ii. Explain the vertical heights represented by the graticules.
- iii. Practise squad in the measurement of horizontal and vertical angles by the use of conspicuous objects on the landscape.

6. Indicate a target and lay the rifle on the point on the ground at which the round has fallen. The class now view the aim and measure the lateral error. They then decide on the necessary correction to be ordered.

7. This subject will be further practised during ranging instruction.

LESSON 48.—RANGING INSTRUCTION

Instructor's notes

Stores :—

Sand model or rifles and rests.

This lesson should be repeated until fire controllers are thoroughly conversant with the principles of ranging.

Keep the fire controller far enough away from the rest of the class to prevent him being influenced by their suggestions.

1. The class will practise the lessons of ranging by one of the following methods :—

i. On a sand model.—

(a) Indicate a target and give the fire controller the estimated range to it, then show him on the sand model the fall of every round which he orders.

(b) Comment on his orders.

ii. By the use of rifles and rests.—

(a) Indicate a target and give the fire controller the estimated range to it, then lay the rifle at the point on the ground at which each round which he orders falls.

(b) Comment on his orders.

LESSON 49.—FIRE FOR EFFECT (POINT TARGETS)

Instructor's notes

Stores :—

Sand model or rifles and rests.

1. Ranging having been completed, fire for effect will normally be opened at the intermediate range of the verified short bracket.

2. There are no rules to be obeyed in firing for effect. The fire controller must use his own judgment as to his action bearing in mind :—

- i. The amount of ammunition available.
- ii. The length of time for which his neutralizing fire is required.
- iii. The nature of the target (e.g. enemy lying in the open or enemy dug in).

3. Fire may be by single bombs fired at irregular intervals at the average rate of 4–8 aimed bombs a minute; or, in exceptional circumstances, it may be in groups of 3–5 bombs fired rapid.

4. Observation of the fall of these bombs may show that further small adjustments in range are needed, corrections at this stage normally being made in 25 yards. If, for instance, the first three bombs fired for effect all fall plus, a downward correction of 25 yards is clearly necessary.

5. Give examples on the model or on the ground of the engagement of point targets under various conditions.

6. Class practise.

SECTION 30.—ENGAGEMENT OF AREA TARGETS

Enemy positions will seldom be located with such accuracy that they can be engaged as point targets. The mortar task will, therefore, usually be the neutralization of a small area within which enemy posts are known or believed to be. This task does not call for the same degree of accuracy as the engagement of point targets.

LESSON 50.—ENGAGEMENT OF AREA TARGETS

Instructor's notes

Stores :—

Blackboard.

This lesson should take the form of a lecture, followed by practice on the model, or open ground.

Practical :—

Sand model or rifles and rests.

1. Ranging :—

- i. Select a suitable point within the area on which to lay the mortar, and obtain the long bracket about that point.

- ii. Fire a group of three rounds at a range (usually the intermediate range of the long bracket) which will ensure the bombs falling within the area.

2. Fire for effect :—

- i. Measure the angular width of the area and estimate its depth.
- ii. Bearing in mind the amount of ammunition available, the amount of time for which neutralizing fire is

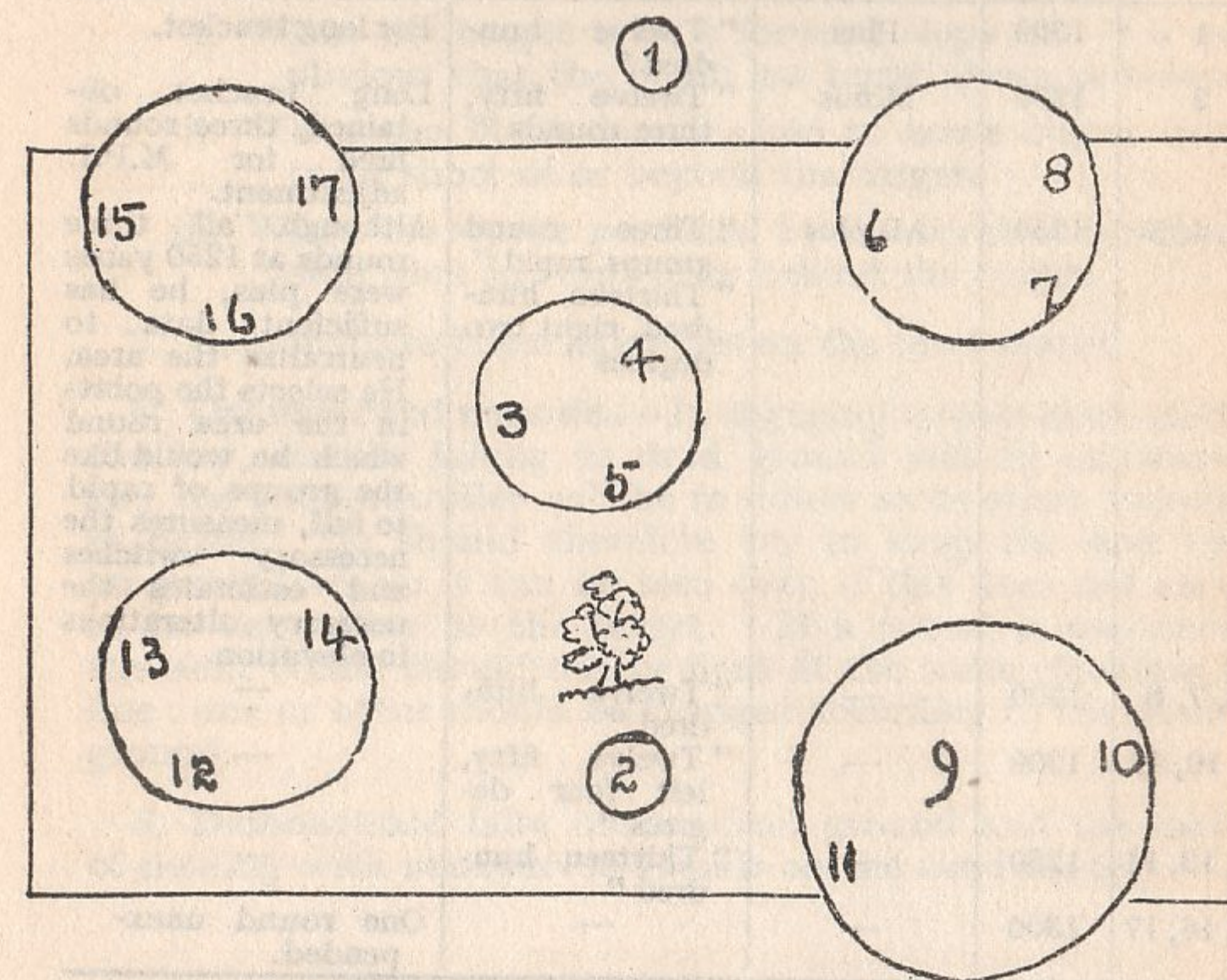


Fig. 2

required, and the positions in the area most likely to contain enemy posts, decide on which parts of the area you will bring fire to bear, and how many rounds you will fire in each group.

- iii. Order “. . . round groups, Rapid ”.
- iv. Alterations will normally be made after each group by controlled corrections. If necessary the intervals between the firing of each group can be reduced by making the corrections and ordering fire whilst the previous group is still in the air.

3. Example (Fig. 2).

Width of area ... 7 degrees.
 Depth of area (estimated) ... 100 yards.
 Point selected for ranging ... central tree at an estimated range of 1300 x.
 Ammunition available ... 18 rounds.

Shot No.	Range yards	Observation of burst	Fire controller's order	Remarks
1	1300	Plus	"Twelve hundred"	For long bracket.
2	1200	Minus	"Twelve fifty, three rounds"	Long bracket obtained, three rounds fired for M.P.I. adjustment.
3, 4, 5	1250	All plus	"Three round groups rapid" "Thirteen hundred, right two degrees"	Although all three rounds at 1250 yards were plus, he has sufficient data to neutralize the area. He selects the points in the area round which he would like the groups of rapid to fall, measures the necessary switches and estimates the necessary alterations in elevation.
6, 7, 8	1300	—	"Twelve hundred"	—
9, 10, 11	1200	—	"Twelve fifty, left four degrees"	—
12, 13, 14	1250	—	"Thirteen hundred"	—
15, 16, 17	1300	—	—	One round unexpended.

4. Give the class further examples to work out.
5. Give further practice during Ranging Instruction.

SECTION 31.—OBSERVATION OF FIRE

LESSON 51.—OBSERVATION OF FIRE

Instructor's notes

Stores :—

Sand model.

1. The fundamental principle of all observation of fire is only to make use of rounds which give definite and certain information.

The fire controller should therefore take advantage of every available form of assistance in order to produce the necessary data for the mortar in the shortest possible time with the minimum expenditure of ammunition.

2. **When the line is incorrect.**—In many cases rounds which are off for line give a doubtful indication for range, and they should not be accepted until the line has been corrected.

In the following instances, however, they give an absolute indication for range and can, therefore, be accepted :—

- i. When the target is on a forward slope and it is quite obvious that the bomb has burst above or below it.
- ii. When the bomb bursts close to some object known to be short of or beyond the target.
- iii. When the smoke produced by the bomb is blown by a side wind in front of or behind the target.

3. Demonstrate these examples on the sand model.

4. **Unobserved rounds.**—In engaging targets in undulating country, rounds falling in dead ground will be unobserved, and the fire controller will be in doubt as to what correction to make. He should therefore try to drop the first bomb on ground where it can be seen even if this does not happen to be very close to the target. If a round is unobserved, the next round should not be fired at the same elevation and line ; one or other should be changed according to the lie of the ground.

5. Demonstrate false crests, dead ground and the method of dealing with unobserved rounds on the sand model.

SECTION 32.—SMOKE

LESSON 52.—SMOKE

Instructor's notes

Stores :—

Blackboard.

This lesson should take the form of a lecture.

1. The factors affecting the behaviour of smoke are :—
 - i. Weather conditions.
 - ii. Ground.
 - iii. Nature of the smoke producing chemical.

2. Weather conditions :—

i. *Wind*.—The direction of the wind determines the course of the smoke screen, and the speed of the wind determines the rate of fire necessary.

Neither a very strong nor a very light wind is favourable, since the former demands a high rate of fire, while the latter allows the smoke to rise in the form of a pillar. A wind of 7 to 15 m.p.h. is the most favourable throughout the year.

ii. *Humidity of the air*.—Damp air is favourable and a dull day increases the density of the screen.

3. **Table**.—The following table grades general conditions into two main headings :—" Good " and " Bad ".

		Good	Bad
Cold weather	...	Wind 7 to 15 m.p.h. Damp.	Wind under 3 m.p.h. Wind over 25 m.p.h.
Hot weather	...	Wind 10 to 13 m.p.h. Damp and overcast.	Wind under 3 m.p.h. Wind over 25 m.p.h. Sunny.

4. **Ground**.—Smoke tends to cling to valleys and the sides of a hill, which are therefore favourable areas for the production of a screen. Trees, buildings, etc., tend to scatter the smoke cloud and increase the " pillaring " effect.

5. **The Chemical**.—The present smoke-producing chemical is white phosphorus which burns with great heat on coming into contact with the air. This results in " pillaring " and consequent loss of screening effect.

6. **Selection of points of origin**.—When ordered to produce a smoke screen, the fire controller must consider the direction of the wind in relation to the area to be screened and the direction from which the screening is required. (Figs. 3 and 4.)

He then selects his point of origin, *i.e.* the point on the ground at which he intends to burst his bombs in order to screen the area from the direction required. Since the screen does not become effective until it has travelled about 30 yards, the point of origin should be about 30 yards to windward of the area to be screened.

If the wind is blowing across the area to be screened, he will normally require only one point of origin. With head or rear winds, or sometimes with oblique winds, two points of

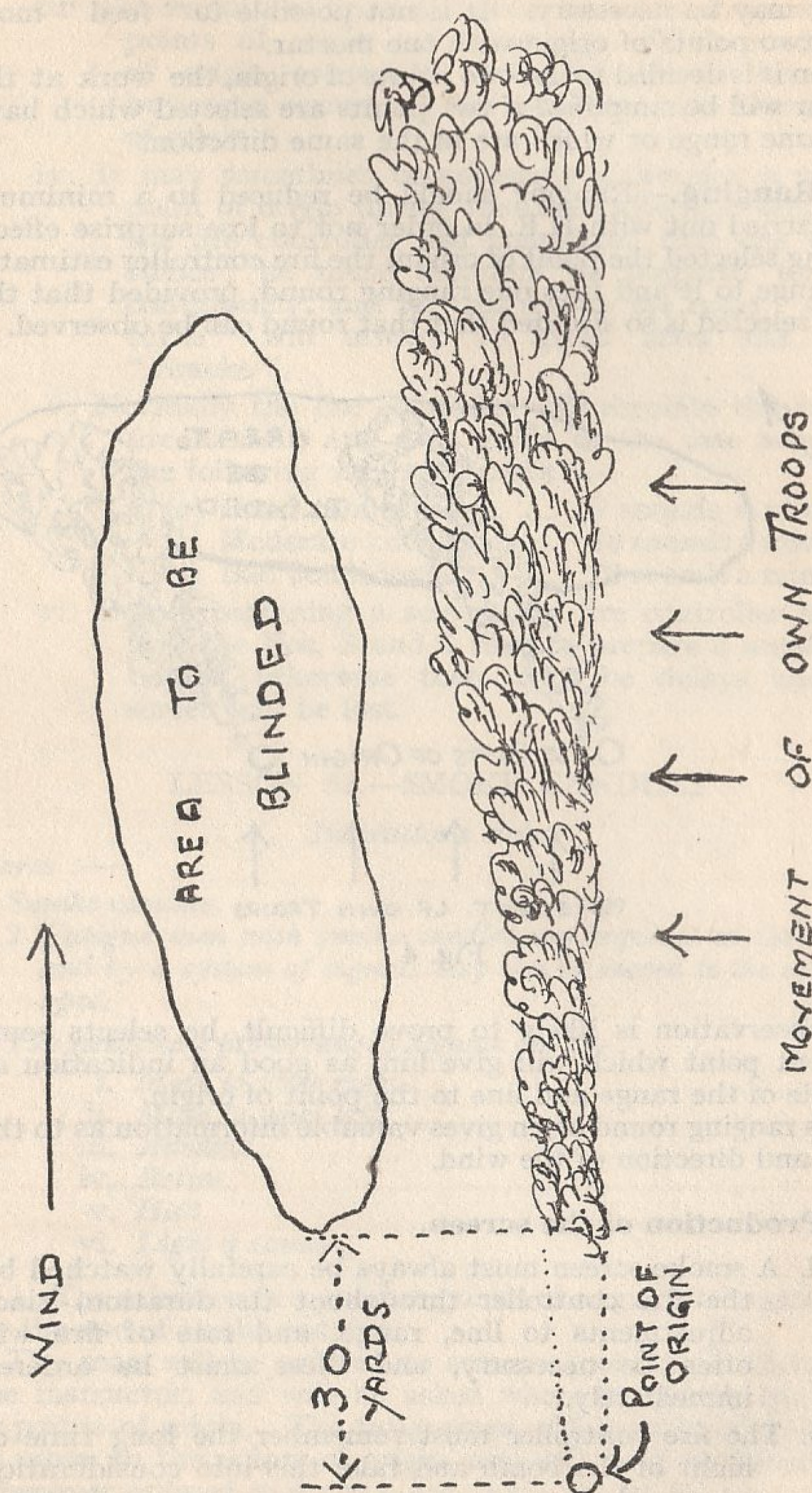


Fig. 3

origin may be necessary. It is not possible to "feed" more than two points of origin with one mortar.

When it is decided to use two points of origin, the work at the mortar will be simplified if two points are selected which have the same range or which are in the same direction.

7. Ranging.—Ranging should be reduced to a minimum and carried out with H.E. in order not to lose surprise effect. Having selected the point of origin, the fire controller estimates the range to it and fires one ranging round, provided that the point selected is so situated that that round can be observed.

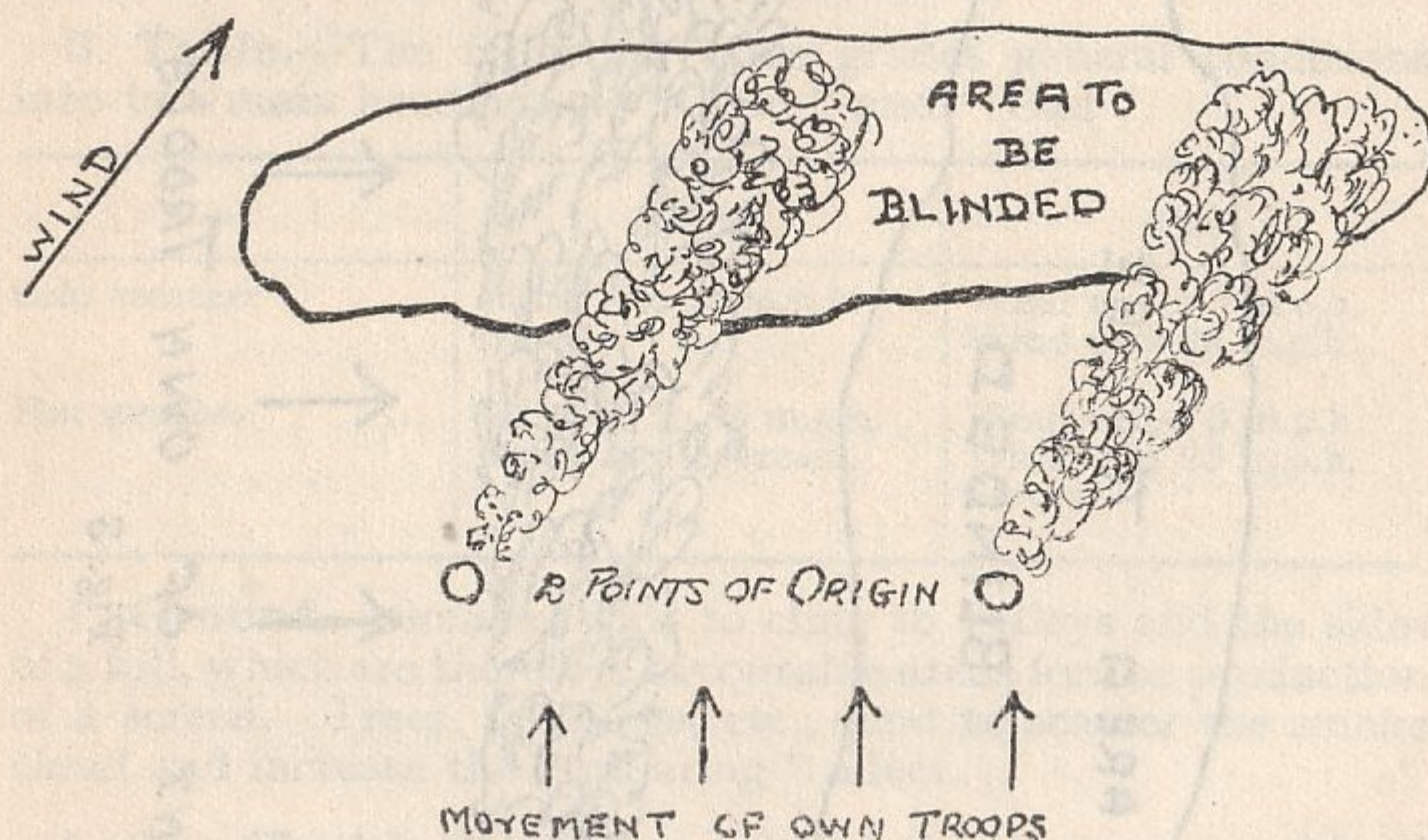


Fig. 4

If observation is likely to prove difficult, he selects some adjacent point which will give him as good an indication as possible of the range and line to the point of origin.

This ranging round often gives valuable information as to the speed and direction of the wind.

8. Production of the screen.

- i. A smoke screen must always be carefully watched by the fire controller throughout its duration, since adjustments to line, range, and rate of fire will often be necessary, and these must be ordered immediately.
- ii. The fire controller must remember the long time of flight of the bomb and take this into consideration when ordering corrections.

iii. The method of fire will depend on whether one or two points of origin are necessary. With one point of origin controlled correction should be used, but rapid corrections are necessary with two points of origin.

iv. It may sometimes be necessary to employ a second point of origin during the shoot although originally the fire controller had considered that one would suffice; he must therefore be prepared for this contingency, and for this reason the order "Check turns" will always be given after the order "Smoke".

v. Normally the fire controller will regulate the rate of fire himself, and as a guide to the rate necessary the following table will assist:—

(a) Good conditions	... 5 rounds a minute.
(b) Moderate conditions	... 10 rounds a minute.
(c) Bad conditions	... 20 rounds a minute.

vi. Before beginning a screen, the fire controller should give the Nos. 3 and 4 time to prepare a number of bombs, otherwise there may be delays and the screen will be lost.

LESSON 53.—SMOKE CANDLES

Instructor's notes

Stores:—

Smoke candles.

2 Fatigue men with smoke candles are required at the target, and by a system of signals they can be moved to the required spot.

The necessary pre-arranged signals are:—

- i. *Move to your right.*
- ii. *Move to your left.*
- iii. *Advance.*
- iv. *Retire.*
- v. *Halt.*
- vi. *Light a candle.*

1. The selection of a point or points of origin can be practised by the use of smoke candles.

The man will be ordered to screen a position indicated by the instructor, and will be asked where he selects his point or points of origin. The fatiguemen will be ordered by signal to move to the points of origin, and will light smoke candles whenever ordered to do so.

The resultant cloud proves the correctness or otherwise of the judgment of wind direction.

2. If the "feeding" of the screen is practised by this means, it should be realized that the smoke bombs do not burn for the same length of time as smoke candles.

SECTION 33.—METHODS OF CONTROL

1. There are three methods by which the fire of the mortar may be controlled :—

- i. *Voice control*.—This method is by far the best and should be adopted whenever possible.
- ii. *Relayed voice control*.
- iii. *Long control*.—A method which enables the O.P. to be sited some distance from, but in sight of the mortar. It should be adopted only when i. and ii. are impossible. It is unsatisfactory for the production of a smoke screen.

LESSON 54.—RELAYED VOICE CONTROL

1. **Procedure**.—The detachment commander is at the observation post. He puts out between the O.P. and the mortar, a connecting file, usually the detachment orderly. He may decide that the detachment corporal is to remain at the mortar to supervise the work at the mortar.

The No. 1 of the detachment treats the connecting file as the fire controller, and does not act on any orders he may chance to hear from the O.P. direct.

Example :—

Detachment commander	...	...	" 1000 Fire ".
Connecting file	...	...	" 1000 ".
No. 1	...	...	" On ".
Connecting file	...	...	" Fire ".
Detachment commander	...	...	" 1100 Fire ".

and so on.

2. **Practice**.—The instructor will indicate targets and the squad will practise fire orders by this method.

LESSON 55.—LONG CONTROL

1. **Procedure**.—The detachment corporal takes command at the mortar placing himself where he can see the detachment commander, who communicates with him by signal.

2. **During ranging**.—The detachment commander acts merely as the eyes of the detachment, signalling back what he sees of the fall of the bombs. The detachment corporal, with his knowledge of ranging, orders the necessary corrections.

3. **Procedure for area targets**.—Having ranged the detachment commander writes out his orders for the engagement of the area and sends them to the detachment corporal at the mortar.

A convenient form for these orders is as follows :—

" . . . round groups rapid ".

No. 1 group ... " . . . hundred, right (or left) . . . degrees ".

No. 2 group ... " . . . hundred, left (or right) . . . degrees ".

and so on.

4. **Practice**.—The instructor will point out the observation post and mortar position, and will indicate a target. The squad will practise the duties of detachment commander and corporal, both for point and area targets, the instructor indicating the fall of the rounds.

SECTION 34.—SAFETY OF OUR OWN TROOPS

1. When mortar fire is to be put down close to our own troops, their safety must be the fire controller's first consideration and it is essential, therefore, that their position and movement is visible from the mortar observation post.

In attack, considerable caution will have to be exercised when observation is obstructed by bad visibility, smoke screens etc., and, without a time table, a definite limitation may be imposed on the mortars.

Apart from the above consideration, the mortar, by reason of its high trajectory, and comparatively small 100 per cent. zone, is well suited to carry out overhead and flanking fire with safety to our own troops.

2. In solving any problem in connection with the safety of our own troops, the worst possible case must always be taken as a basis for applying the rule.

LESSON 56.—OVERHEAD FIRE

1. **Procedure before firing** :—

Before firing the first round, the fire controller must find out, in the following way, the minimum range that can be used with safety :—

- i. Determine the range to our own troops.
- ii. If the range to our own troops has been *judged*, and is found to be more than 400 yards, the minimum safety range is the judged range to our own troops plus 400 yards.
- iii. In all other cases, the minimum safety range is the range to our own troops plus 300 yards.
- iv. Add to these figures any allowance for head wind.

2. Procedure during ranging :—

- i. If the range to the target is greater than the minimum safety range, ranging can proceed normally, provided that no round is fired below this minimum range.
- ii. If the range to the target is less than the minimum safety range, two rounds should be fired at the minimum safety range. If both these rounds fall short of the target, ranging can proceed normally, provided that no round is fired below the minimum safety range.
- iii. If these two rounds fall beyond the target, the fire controller may continue to fire if he considers that the damage done by bombs fired at that range is worth the further expenditure of ammunition.

3. Procedure after ranging :—

- i. Once ranging on to a target has been completed fire on to that target may continue until our own troops reach a point within 250 yards of it.
- ii. The fire controller will select a point on the line of advance which he estimates, or which the range-taker tells him, to be 250 yards from the target. He will indicate this point to the rifle commander and will explain that after the attacking troops have reached this point, mortar fire will have to cease.

4. Explain that the above figures apply to cases where our own troops are in the open and liable to be hit by splinters from the bomb. In conditions of trench warfare where our own troops are protected by their cover from splinters, common sense will show what modification may be made to these figures, but at no time should targets be engaged which are less than 150 yards from the troops.

5. Demonstrate situations on the sand table to explain the above procedure, and insist on the closest possible co-operation between rifle and mortar commanders.

LESSON 57.—FLANKING FIRE

Instructor's notes

Stores :—

Graticuled glasses.

1. When our own troops are on the flank of the target, the fire controller must ensure that no round is fired in a direction which will bring the line of fire nearer to our own troops than 200 yards.

2. The following guide for converting 200 yards into degrees at the various ranges should be memorized.

200 yards subtends 23 degrees at 500 yards range.
 13 degrees at 1000 " "
 8 degrees at 1500 " "

For intermediate ranges between 500 yards and 1000 yards, subtract 2 degrees for each 100 yards.

For intermediate range between 1000 yards and 1500 yards, subtract 1 degree for each 100 yards.

Example :—

1. 200 yards at 800 yards range = $23^{\circ} - 6^{\circ} = 17$ degrees.
2. 200 yards at 1300 yards range = $13^{\circ} - 3^{\circ} = 10$ degrees.

3. **Practice.**—Indicate targets on the ground, also the position of our own troops, stating whether they are stationary or advancing. The squad will practise the solution of the safety problems.



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